Treatment of Mycotic Aortic Aneurysms with Endoluminal Grafts

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Purpose. To report the benefit of endoluminal repair of mycotic aortic aneurysms and highlight the need for a registry.

Methods. Nine patients (five female) were identified over 5 years (1998–2003) as having presumed mycotic aortic aneurysms (12 in total) suitable for endoluminal grafting. A total of nine thoracic and three abdominal were grafted and followed up for a median of 36 months.

Results. Six of the aneurysms have resolved and one was converted to an open repair. There was one early death from rupture of a second undiagnosed aneurysm and two late deaths from rupture due to persistent inflammation. Long-term antibiotics have not been mandatory to ensure survival.

Conclusions. Mycotic aortic aneurysms of the thoracic and abdominal aorta do benefit from endoluminal repair, particularly when arising in previously normal aortic tissue. Endoluminal grafting also has a role in the palliation of secondarily infected aortas and so to prove its efficacy in the treatment of all these rare cases a registry is required.

Keywords: Mycotic aneurysm; Endovascular stent graft; Thoracic aorta; Abdominal aorta; Infected false aneurysm.

Introduction

Mycotic aneurysms were first described by Osler in his Gulstonian lecture of 1851 on malignant endocarditis1 and although they may be life threatening they are relatively uncommon. The term mycotic aneurysm is a misnomer as it is applied to bacterial rather than fungal infection. Its use should perhaps be restricted to those aneurysms resulting from bacteria originating in a distant site of infection, which has been estimated to account for 0.85% of all aortic aneurysms.2 The traditional treatment of infected aneurysms is excision of the aneurysm with debridement of the surrounding infected inflammatory tissue followed by either in situ repair or extra-anatomical bypass.3 The largest recent series showed that open surgery was associated with significant morbidity and mortality.4 The operative mortality rate was 36% and was probably related to 85% of the cases being ruptured. There are an increasing number of reports in the literature of endovascular treatment of both the thoracic and the infra renal aorta for infected false mycotic aneurysms.5–7 These have confirmed the technical feasibility of endoluminal repair, however, the numbers are small and the follow-up is short so that more evidence is required before this treatment can be recommended.8–14 We describe our experience with nine patients who underwent endovascular stenting for mycotic aneurysms in the five-year period 1998–2002 and their subsequent follow-up.

Patients and Methods

Since 1998 patients presenting with infected false aneurysms of the aorta in which open repair was thought to be too hazardous, were assessed for suitability for endoluminal repair. Contrast CT scans and angiography were used to investigate such patients. Nine patients with a total of 12 mycotic aneurysms were identified as suitable for endovascular treatment either alone or as a hybrid procedure with open surgery. The case details are summarised in Table 1. During this period another two patients underwent open surgery for mycotic aortic aneurysms. One patient presented with a history of back pain and fever following Salmonella gastroenteritis (Fig. 1). Two patients had undergone previous thoracic aortic grafts, one for aortic transection and one for...
acute type B dissection. The first developed an aorto-oesophageal fistula and the second an aorto-bronchial fistula. Another patient presented with an aorto-cutaneous fistula following previous radiotherapy for breast cancer (Fig. 2). Two patients required right to left carotid–carotid bypass so that the origin of the left common carotid artery could be covered by the endograft.

Follow-up was by CT scan at 3 months and annually thereafter unless there was a clinical incident requiring urgent investigation when further CT scans were performed.

Results

The results are summarised in Table 2. One patient who had synchronous false aneurysms of both the thoracic and abdominal aorta treated simultaneously developed paraplegia perioperatively. This first developed an aorto-oesophageal fistula and the second an aorto-bronchial fistula. Another patient presented with an aorto-cutaneous fistula following previous radiotherapy for breast cancer (Fig. 2). Two patients required right to left carotid–carotid bypass so that the origin of the left common carotid artery could be covered by the endograft.

Discussion

Infected false aneurysms (mycotic) of the aorta are an uncommon occurrence but present a formidable challenge with regard to their management. Traditional teaching supports open surgical treatment with debridement of infected tissue and in situ repair with antibiotic soaked grafts.4 In the abdominal aorta, deep veins have been used as an effective autologous conduit.16 An alternative is to oversew the aorta and perform an extra anatomical bypass.4,15 However, in the largest recent series the mortality for open mycotic aneurysm repair was 36%. The advances and lower mortality now associated with endovascular repair
makes it an attractive option for treating mycotic aneurysms but this approach remains controversial due to the placement of the stent-graft in an infected field. The lack of debridement goes against surgical teaching, however, there have been case reports of endovascular cases that have remained well up to 2 years following their procedure. Stanley et al. in their report of four patients describe long-term antibiotics as being a mandatory component of endovascular treatment of infected aneurysms, however, this may not...
be the case as approximately a quarter of tissue cultures from surgical debridement of mycotic aneurysms show no bacterial growth.

We have reported nine cases where endoluminal stenting was used to treat aortic false aneurysms, which were all assumed to be infected despite lack of positive blood cultures. This is consistent with previous studies. In five of these cases the treatment has been entirely successful with a total of six false aneurysms being excluded and subsequently resolving with a range of follow-up from 16 to 42 months. In four of these cases the aneurysms had arisen after a previous infective episode in previously normal aorta. The remaining cases were a higher risk group of a false aneurysm at the site of a thoracic graft anastomosis presenting as an aorto bronchial fistula. These results support the fact that where open surgery is high risk in the presence of a mycotic aneurysm in previously non-aneurysmal aorta it is feasible in both the short and median/long term to perform an endoluminal repair. We did have an early fatality in such a patient but this was due to the rupture of a previously undiagnosed second aneurysm that was unable to be stented at the initial procedure due to lack of availability of a suitable device. Mycotic aneurysms are often multiple and we would recommend that careful imaging of the whole of the thoracic and abdominal aorta is performed to exclude any other synchronous silent pathology. In the other case of endoluminal stenting of a primarily infected aorta the procedure was technically unsuccessful with a proximal endoleak despite the hybrid approach of carotid-to-carotid bypass and endoluminal coils, however, this patient was successfully converted to an open repair.

The two remaining cases which both led to late deaths highlight the scenario where in a grossly abnormal tissue field, the endoluminal stent will not provide curative treatment but since open surgery is considered to be a very high risk, there is the possible role for palliation when combined with antibiotics as suggested by Stanley et al. It may be debatable as to whether it was appropriate to treat the aortocutaneous fistula but in this patient she had a good quality of life for her last 5 months. Thus in selected

Table 2. Late results

<table>
<thead>
<tr>
<th>Patients</th>
<th>Thirty day mortality</th>
<th>Thirty day morbidity</th>
<th>Length of follow up (months)</th>
<th>Late mortality</th>
<th>Aneurysm resolution</th>
<th>Late stent morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alive</td>
<td>–</td>
<td>62</td>
<td>Died</td>
<td>No</td>
<td>Recurrent haematemesis at 52 months, successful restenting, symptoms recurred 10/12 later</td>
</tr>
<tr>
<td>2</td>
<td>Alive</td>
<td>Limb ischaemia requiring open infra renal AAA repair</td>
<td>56</td>
<td>Alive</td>
<td>No</td>
<td>Persistent proximal endoleak, failed coiling, open repair at 6 weeks</td>
</tr>
<tr>
<td>3</td>
<td>Died of ruptured unstented aneurysm day 2</td>
<td>0</td>
<td></td>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Alive</td>
<td>–</td>
<td>42</td>
<td>Alive</td>
<td>Yes</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>Alive</td>
<td>–</td>
<td>36</td>
<td>Alive</td>
<td>Yes</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>Alive</td>
<td>–</td>
<td>28</td>
<td>Died</td>
<td>No</td>
<td>Recurrent bleed from fistula, fatal</td>
</tr>
<tr>
<td>7</td>
<td>Alive</td>
<td>–</td>
<td>27</td>
<td>Alive</td>
<td>Yes</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>Alive</td>
<td>Recurrent bleed requiring proximal extension cuff. Paraplegia resolved on CSF drainage, PE, and C. difficileitis</td>
<td>16</td>
<td>Alive</td>
<td>Yes in both case</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Alive</td>
<td>–</td>
<td>27</td>
<td>Alive</td>
<td>Yes</td>
<td>Left leg claudication requiring Fem–Fem cross over graft Four late complications</td>
</tr>
</tbody>
</table>

One death Two early complications Median = 36 months Two deaths
cases it would seem appropriate to palliate those patients against imminent rupture and death whilst accepting that residual infected foreign material will prevent resolution and that where surgery is considered to be too high a risk, life-long antibiotics would be required.

In conclusion, this small series shows that some patients with false aortic aneurysms of the thoracic
and abdominal aorta may benefit from endoluminal repair. This particularly applies to those with aneurysms affecting previously normal aortic tissue. Endoluminal repair of false aneurysms in such patients gives medium term results, which equate or are better than the most recent series of open repair.\(^4\),\(^15\) To answer the questions of long term success and the usage of long term antibiotics we feel that a multicentre trial is required to compare against open repair and to determine the most appropriate graft material to use in an infected field.\(^17\) However, given the rarity of the condition, a registry of endoluminal repair of false aneurysms may be the most pragmatic way of proving their efficacy.

References


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