Endovascular Repair of Inflammatory Abdominal Aortic Aneurysms with Special Reference to Concomitant Ureteric Obstruction

R. Deleersnijder, K. Daenens, I. Fourneau, G. Maleux and A. Nevelsteen

Center for Vascular Diseases, University Clinic Gasthuisberg, Leuven, Belgium

Objectives: to study the technical feasibility and results of endovascular treatment of inflammatory abdominal aortic aneurysms (AAA).

Design: prospective study.

Material and methods: seven patients underwent endovascular repair of an inflammatory AAA. Five patients (8 ureters) were treated with ureteric stents. CT scans were obtained one year.

Results: the early technical success rate was 100%. Four ureters remained entrapped at one year. Partial regression of periaortic fibrosis was documented in three patients, while four patients showed no regression.

Conclusion: endovascular reconstruction of inflammatory abdominal aneurysms is technically feasible. Further study is warranted with regard to the evolution of the periaortic fibrosis and the possible benefits for patients with concomitant hydronephrosis.

Key Words: Inflammatory aneurysm; Endoprosthesis; Hydronephrosis; Endovascular.

Introduction

Inflammatory abdominal aortic aneurysms (IAAA) are a variant of atherosclerotic AAA and have an incidence ranging from 2.2 up to 18.1%. They are characterised by dense periaortic fibrosis that may entrap various anatomical structures. In 15–30% of the cases one or both ureters are involved leading to hydrenephrosis and even uraemia.

Due to the periaortic fibrosis, the surgical treatment of an IAAA is considered more difficult resulting in a higher morbidity and mortality rate, especially when ureterolysis is performed in case of associated hydronephrosis.

This may render endovascular repair an attractive alternative. In this report we describe our experience in seven patients, of whom five presented with associated hydronephrosis.

Patient, Material and Methods

Between January 1996 and June 1999, we observed 37 patients with an IAAA. All on the basis of contrast-enhanced spiral CT-scan and calibrated angiography, endovascular repair was thought possible in seven cases (Figs 1a, 2a) (all male, mean age of 59 [range 51–70] years). Four patients had smoked for over 30 years, and three had symptomatic coronary artery disease two were being treated for arterial hypertension. None of the patients was diabetic or suffered from cerebrovascular insufficiency.

Three patients were asymptomatic. One presented with atypical abdominal pain, while another three were admitted with acute renal failure due to bilateral hydronephrosis. Two of these three were initially treated at the department of Urology with a bilateral nephrostomy, followed after three days by bilateral ureteric stent insertion. The third patient received immediately a bilateral ureteral stent. All three patients regained normal renal function after one week.

CT-scan also documented associated unilateral hydronephrosis in two of the three asymptomatic patients. One of these patients received a unilateral ureteral stent. The hydronephrosis in the last patient, also due to periaortic fibrosis, was left alone, because it concerned a very small non-functional kidney.

After discharge, all patients were followed according to the Eurostar protocol. Decrease or increase of periaortic fibrosis at 1 year was defined as a change of the fibrosis thickness of at least 25% in comparison with the preoperative measurements.
All procedures were done in the operation theatre under general anaesthesia. Five different endoprostheses were used according to the availability of the stent grafts, the preoperative measurements and the preference of the surgeon: Stentor (Mintec, La Ciotat, France) \( n = 1 \), Talent (Medtronic World Medical, Sunrise, FL, U.S.A.) \( n = 1 \), Excluder (Gore WL and associates, Flagstaff, AZ, U.S.A.) \( n = 1 \), Vanguard (Boston Scientific Corporation, Natick, MA, U.S.A.) \( n = 2 \) and Zenith (Cook Inc., Bloomington, U.S.A.) \( n = 2 \). All stent grafts could be placed accurately (immediate technical success rate 100%). One patient sustained peroperatively a rupture of the common iliac artery with massive blood loss during post-deployment molding of the (Talent) endograft. He was treated by temporary balloon tamponade and extension of the stent graft to the external iliac artery.
There were no early postoperative complications and the mean hospital stay was five days (range 4–13 days). The mean follow-up period of this series was 29 months (range 18–60 months). There were no late deaths, but two patients developed a graft related complication. The first patient, who received a Zenith graft presented with claudication due to graft limb stenosis after 15 months. He was handled by percutaneous dilatation and stenting. The second patient developed a graft limb thrombosis after 26 months (Vanguard endograft) and was successfully treated with a femorofemoral crossover graft.

With regard to the associated hydronephrosis (five patients), four of the seven ureteral stents (two patients) were removed within 6 months. These two patients were followed further on by spiral CT-scan for respectively 53 and 12 months and developed no signs of ureteral entrapment. In the two other cases of treated hydronephrosis, the three ureteral stents were repetitively removed resulting each time in restenosis. Despite concomitant and aggressive corticosteroid treatment, these stents are still in place after respectively 28 and 27 months. As already stated, hydronephrosis was not treated in the fifth patient, and here also there was no regression.

Detailed data on preoperative and 1 year aneurysm diameter and evolution of periaortic fibrosis are shown in Table 1. The median preoperative maximum aneurysm diameter was 48 mm (range 42–68 mm). The median thickness of the periaortic fibrosis was 14 mm (range 9–22 mm). The median maximum aneurysm diameter at 1 year was 45 mm (range 40–54 mm). None of the patients showed complete regression of the periaortic fibrosis. Partial regression (>25% decrease) was noted in three cases (Fig. 1b), while four patients showed no regression at all (Fig. 2b). These four also include the two patients with continuing ureteric obstruction. Finally, none of the patients showed worsening of the peri-aortic fibrosis on the one year postoperative CT scan.

### Table 1. Preoperative and 1 year postoperative CT data.

<table>
<thead>
<tr>
<th>Patient</th>
<th>1</th>
<th>2</th>
<th>3*</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aneurysm diameter mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>48</td>
<td>48</td>
<td>50</td>
<td>60</td>
<td>68</td>
<td>45</td>
<td>42</td>
<td>48 mm</td>
</tr>
<tr>
<td>Postoperative</td>
<td>40</td>
<td>47</td>
<td>48</td>
<td>40</td>
<td>54</td>
<td>45</td>
<td>41</td>
<td>45 mm</td>
</tr>
<tr>
<td>Periaortic fibrosis mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>20</td>
<td>12</td>
<td>18</td>
<td>16</td>
<td>14</td>
<td>09</td>
<td>09</td>
<td>14 mm</td>
</tr>
<tr>
<td>Postoperative</td>
<td>PR</td>
<td>PR</td>
<td>PR</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>Ureter obstruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperatively</td>
<td>P*</td>
<td>P*</td>
<td>P</td>
<td>P</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>1 year postoperatively</td>
<td>A</td>
<td>A</td>
<td>P</td>
<td>P</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Bilateral ureter obstruction

** Discussion **

The surgical treatment of IAAA is frequently associated with an elevated mortality and morbidity rate.2,10–14 Simple ureteric stenting without ureterolysis might reduce the incidence of pre- and postoperative complications.2,11,12

Endovascular repair of IAAA has been mentioned only anecdotally in the literature.7,15,16 Our report confirms that it can be safely performed from a technical point of view. More recently, Vallabhaneni et al reported on a series of six patients.8 Based on CT scan performed 6 months postoperatively, they documented worsening of the peri-aortic fibrosis resulting in ureteric obstruction in two patients. In the remaining four patients, the fibrosis did not reduce postoperatively. In our series, we did not observe worsening of the periaortic fibrosis. However none of our patients showed complete regression, while partial regression was noted in three cases only. Although none of our patients developed ureteric obstruction after endovascular repair, preoperative ureteric entrapment was cured in only two patients, while two other patients continue to have ureteric obstruction after more than 2 years. When compared with open surgery, this suggests at least a less favourable evolution.6,17

Also because there is no uniform theory to explain the development of IAAA, we can only speculate on the reasons for these observations. In open surgery, it has been documented that “old” peri-aortic fibrosis with a cell/fibrosis rate <1 tends to decrease far less easily in the postoperative period than “young” fibrosis with a cell/fibrosis rate >1.1 Although, due to the endovascular approach, we have no pathologic proof, it might therefore be that the patients without regression of the fibrosis in our series all presented with “old” fibrosis. Some authors have suggested that IAAA might result from aneurysm expansion resulting in lymphatic stasis and peri-aortic fibrosis.5,18,19

In our series, the patients with ureteric involvement presented indeed with the largest aneurysms. It is also striking that the two patients without relief of ureteric involvement presented with the largest aneurysms preoperatively. These results support the last mentioned theory.

In conclusion, we certainly admit that our findings should be interpreted with caution since our experience consists of only seven patients. At least,
we documented that endovascular reconstruction is technically feasible and safe in case of IAAA. Our experience warrants however also further study with regard to the possible benefits of endografting in patients with concomitant hydronephrosis.

References


Accepted 11 May 2002