

The first endovascular repair of an acute type A dissection using an endograft designed for the ascending aorta

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Endovascular repair has emerged as a potential alternative to emergency open surgical repair for type A dissection in selected patients, with isolated reports describing the results obtained with a range of devices designed originally for the descending aorta. We believe that we present the first reported repair of an acute ascending aortic dissection using an endovascular stent graft manufactured specifically for the ascending aorta. (*J Vasc Surg* 2012;55:220-2.)

Endovascular solutions are now preferable to open surgery in the management of many vascular pathologies. Type A dissections of the ascending aorta have historically been treated with urgent open surgical repair. Endovascular repair, despite its unique difficulties, has emerged as a potential alternative with successful isolated reports describing the use of devices originally designed for the descending aorta.^{1,2} We believe that we present the first reported repair of an acute ascending aortic dissection using an endovascular stent graft specifically designed for the ascending aorta.

CASE REPORT

A 68-year-old woman with a history of hypertension and current smoking was admitted to our hospital with sudden-onset chest pain. Her chest x-ray, electrocardiogram, serum troponin, and d-dimer tests were normal, but over the next 72 hours, she developed atrial flutter and systemic inflammatory response syndrome with acute renal failure requiring hemofiltration, a pericardial, and bilateral pleural effusions.

Four days after the patient's initial presentation, a transthoracic echocardiogram and computed tomography (CT) pulmonary angiogram revealed an aortic intramural hematoma from a type A dissection; contrast extravasation in the ascending aorta from an intimal tear with hematoma in the aortic wall (Fig 1). The patient was considered unfit for open repair in view of the acute renal failure and systemic inflammatory response, but she consented to an endovascular approach with a stent specifically designed for the ascending aorta.

With the patient under general anesthesia, the right brachial artery was punctured percutaneously, and the left common femoral artery (CFA) exposed. Angiography identified the position of the



Fig 1. Sagittal computed tomography (CT) image of acute type A Stanford dissection showing extravasation of contrast anterior to ascending aorta (*white arrow*).

coronary and innominate arteries. Via the CFA, a 34-mm-diameter Zenith Ascending Dissection device (Cook Medical, Bjaeverskov, Denmark) was positioned across the aortic valve over a Lunderquist extra-stiff guidewire (Cook Medical). With overdrive pacing-

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Fig 2. The Zenith Ascending Dissection stent.



Fig 3. Sagittal computed tomography (CT) image of stent graft in the ascending aorta with no extravasation of contrast into the false lumen.

induced hypotension, the stent (Fig 2) was withdrawn and deployed in the ascending aorta. Angiography confirmed exclusion of the false lumen with patency of both coronary and innominate arteries. After surgery, the patient was extubated within 24 hours. A CT scan confirmed satisfactory coverage of the intimal tear with no contrast extravasation (Fig 3). The patient made a successful recovery with her renal function returning to normal.

The Medicines and Healthcare products Regulatory Agency (MHRA) granted our trust permission to deploy three Zenith Ascending Dissection stents on compassionate grounds. This was approved by the New and Novel Procedures committee at St George's Hospital.

DISCUSSION

Emergency surgical intervention remains the gold standard treatment for type A aortic dissection and intramural hematoma, yet up to 30% of patients with this pathology are unable to undergo an open repair.³ In those patients unfit for open repair, endovascular therapy has emerged as a possible alternative. A number of case reports have demonstrated the feasibility of endovascular stent grafting to repair type A dissection, some of which have incorporated simultaneous stenting of the coronary ostia.^{4,5}

Stenting of the ascending aorta presents unique challenges, including negotiation of the curvature of the aortic

arch, obtaining proximal fixation close to the aortic valve and coronary ostia, distal fixation which may impinge on the innominate artery, hemodynamic forces in this arterial segment, and the potential for fatal retrograde dissection. Overpacing and partial right atrial inflow occlusion help improve stent positioning during graft deployment.⁶ Major complications include left ventricle perforation by stiff guidewire manipulation, or massive embolic stroke.⁶ Previous stents deployed in ascending aortas include a GORE Excluder Aortic Extender device (GORE Excluder Aortic Extender; W. L. Gore & Associates, Flagstaff, Ariz)⁴ and a Medtronic endovascular stent graft (The Netherlands),⁵ neither of which were designed for use in the ascending aorta.

We believe that this case represents the first published use of an endograft designed specifically for use in the ascending aorta with supporting completion imaging. The Zenith Ascending Dissection nitinol stent graft can be deployed from a

femoral route due to its 100-cm flexor system, and includes a soft flexible tip, which reduces valve and ventricular trauma. The stent is 85 mm long with bare proximal and distal stents and a 65 mm covered component in between (Fig 2). This patient had a midascending aortic lesion making it suitable for stent coverage, however, tears close to the coronary or innominate arteries may not be. The midterm results of this technique remain unknown and greater experience of the device is required before its routine use can be recommended in anatomically suitable candidates.

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