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Treatment of Delayed Retrograde Dissection after Endovascular Stenting of Thoracoabdominal Aortic Aneurysm: Graft-to-Endograft Anastomosis

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ABSTRACT

Introduction: Endovascular treatment of thoracic aortic aneurysms may be associated with procedure-related early and late complications.

Report: We describe the case of a 70-year-old man who developed acute retrograde dissection of the ascending aorta 30 days after endovascular stent grafting of a thoracoabdominal aortic aneurysm and prior revascularization of the left subclavian artery. The ascending aorta and aortic arch were successfully replaced with a Dacron graft; the distal part of the graft was partially anastomosed to the previously placed endograft.

Discussion: Surgical repair of dissections following a thoracic endovascular procedure is reliable with a graft-to-endograft anastomosis when native aortic tissue is not suitable.

INTRODUCTION

Aortic dissection is a rare complication after endovascular stenting; if it occurs, it is usually detected in conjunction with the procedure [Pasic 2002; Bethuyne 2003; Kpodonu 2008]. This report presents a case of acute retrograde aortic dissection that occurred as a complication 30 days after endovascular stent graft repair of a thoracoabdominal aortic aneurysm.

PATIENT AND TECHNIQUE

A 70-year-old man presented with chest pain. A review of his medical history revealed hypertension, and an echocardiography examination showed mild aortic regurgitation. A coronary angiography evaluation revealed 60% stenosis of the left anterior descending coronary artery (LAD). A computer tomographic (CT) scan revealed a fusiform aneurysm from the left subclavian artery to 1.5 cm proximal to the celiac artery, with a maximal diameter of 70 mm (Figure 1A). Endovascular treatment was planned. With the patient under general anesthesia, we first performed a left caroticosubclavian artery bypass with an 8-mm Vascutek graft (Vascutek/Terumo, Renfrewshire, UK) and then introduced a Talent LPS endoprosthesis (44 mm, 20 cm; Medtronic, Minneapolis, MN, USA) via a right femoral artery access. The left subclavian artery was overstented. A second graft was inserted distally (46 mm, 20 cm; Medtronic). The patient's postoperative course was uneventful, and he was discharged on the third postoperative day. His control CT scan revealed an intact endovascular stent and intact aortic tissues on the 30th day (Figure 1B); however, on the 32th postoperative day, the patient entered our emergency department with chest pain. A CT scan revealed a retrograde dissection from the proximal part of the endograft (Figures 2A and 2B). Emergent surgical repair was planned. Exploration of the aorta revealed the entry site of the dissection to be at the convexity of the arch, between the left common carotid artery and the brachiocephalic trunk. The intimal flap extended via the retrograde route into the ascending aorta. The aorta was reconstructed with a 32-mm graft (Gelweave; Vascutek/Terumo). The distal part of the graft was partially anastomosed to the previously placed endograft along the alignment with the minor curvature of the arcus aorta (Figure 2C). The left carotid artery and the brachiocephalic trunk were subsequently revascularized separately with 8-mm grafts. The aortic valve was repaired, and the LAD was bypassed with a saphenous vein graft. The postoperative period was uneventful. A CT scan at the fourth postoperative week confirmed a satisfactory repair (Figure 2D). A follow-up at 1 year revealed no complications.

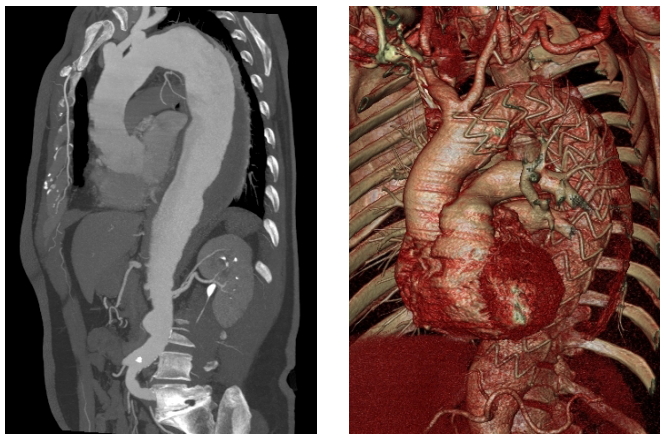

Figure 1. A, Computed tomography (CT) scan of thoracoabdominal aneurysm from left subclavian artery through 1.5 cm proximal to the celiac artery. B, A control CT scan revealed an intact endovascular stent and intact aortic tissues on the 30th postoperative day.

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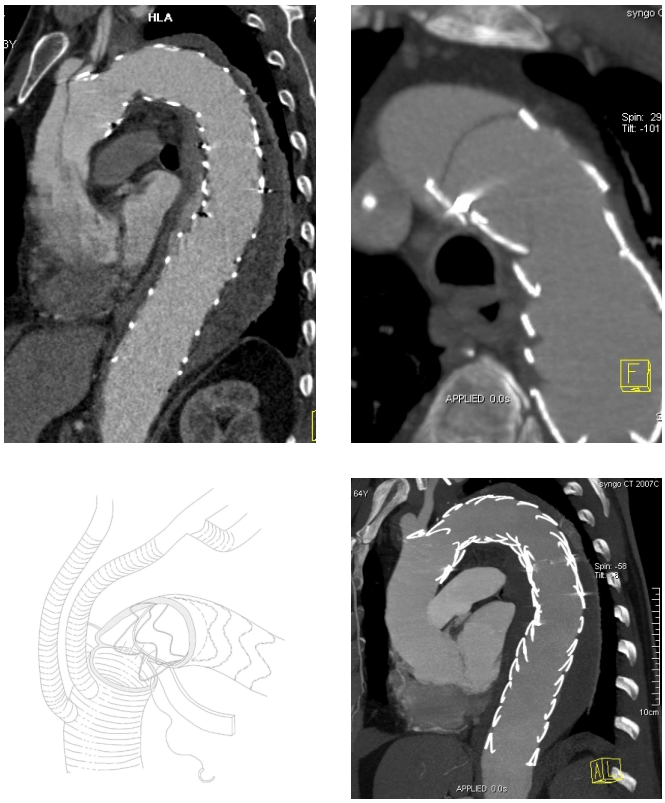

Figure 2. Computed tomography (CT) scan of a retrograde dissection from the proximal part of the endograft (A, B), partial anastomosis of the graft to the previously placed endograft along the alignment with the minor curvature of the arcus aorta (C), and a control CT scan confirming a satisfactory repair (D).

DISCUSSION

Retrograde aortic dissection after a thoracic endovascular procedure is a rare but serious complication. It usually occurs during the early postoperative period. There are several possibilities that can lead to a late dissection following an endovascular repair [Pasic 2002; Neuhauser 2005; Kpodonu 2008]:

1. The dissection might have occurred during the endovascular procedure because of catheterization or device deployment but was not recognized in perioperative angiographic images. An early-postoperative CT scan may be helpful in cases with fragile aortic pathologies.
2. A small intimal tear might have occurred during the intervention but was not immediately enlarged. The tear might have extended later in a retrograde manner. Slow and sensible catheterization and device deployment are important in preventing this kind of complication.
3. The dissection might have occurred independently of the endovascular procedure. Strict control of arterial pressure postoperatively may have a beneficial effect.
4. The dissection could have been related to the stent graft itself and occurred at any time during the postoperative period. The dissection then could have undergone extension during the subsequent weeks.

We suggest that the stiffness of the stent graft device with its aggressive anchoring designs and its limited angulation capacity might have initiated an intimal tear in this case. A hypertensive attack during the late postoperative period might also have had an impact. Undoubtedly, both the impact force during deployment of the stent graft and the hemodynamic shear stress on the aortic wall prompted extension of the dissection. This complication most likely reflects the inability of a highly rigid stent graft device to accommodate to the curved geometry of the distal aortic arch, especially when the angle exceeds 60 degrees. Additionally, proper selection of patients on the basis of specific anatomic landmarks remains a major consideration in the prevention of this kind of life-threatening complication. The other important point in this case was that there was no native aortic tissue on which to perform an anastomosis in the distal part of the dissection area during the operation. The anastomosis was performed between the ascending aortic graft and the circumferentially posterior third part of the previously placed endograft.

In conclusion, we suggest that retrograde dissections of the ascending aorta that occur following a thoracic endovascular procedure may evolve, and not only during the early postoperative period. Surgical repair is realizable with a graft-to-endograft anastomosis when native aortic tissue is not suitable. Further refinements should be directed toward lower-profile, more flexible, and less traumatic stent grafts and delivery systems. The proximal end may be fully covered but may be sufficiently solid to provide a tight circumferential seal to minimize aortic injury.

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