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Brief Communications

Successful treatment of a Stanford type A dissection by percutaneous placement of a covered stent graft in the ascending aorta

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The criterion standard treatment for acute Stanford type A aortic dissection is emergency surgical intervention. Stent-graft placement has emerged as an alternative treatment for various descending aortic pathologic conditions, including complicated type B dissections, aortic rupture, giant penetrating ulcers, aneurysms, and stent-graft coverage of the primary intimal tear.[1,2] A combined surgical and endovascular approach for acute ascending aortic dissection has been reported.[3] We report on percutaneous stent-graft placement in the ascending aorta as a primary and sole treatment for acute Stanford type A dissection.

Clinical Summary

An 89-year old woman was admitted for acute onset of severe chest and back pain. A spiral computed tomographic (CT) angiogram demonstrated severe atherosclerotic degeneration, extensive intramural hematoma from the aortic root to the level of the celiac axis, and a primary intimal tear in the distal ascending aorta. Extensive blood in the mediastinum and pericardium suggested a contained rupture (Figure 1).

Because of the patient's advanced age and her overall frail status, she was deemed to be at high risk for surgery. She firmly declined surgical intervention. Blood pressure control was achieved in the intensive care unit. The next day, the patient remained hemodynamically stable with overall good end-organ perfusion.

When presented with the option of stent-graft placement, the patient agreed to proceed, and written informed consent was obtained. An aortogram demonstrated progression to complete dissection with patent false lumen (Figure 2). This was confirmed by intraoperative transesophageal echocardiography. With the patient under general anesthesia, a Genesis 3910 bare stent (Cordis, Warren, NJ) was dilated to a diameter of 14 mm in the brachiocephalic artery. A 40 × 10-mm Excluder stent graft (W. L. Gore & Associates, Inc, Flagstaff, Ariz) was deployed in the ascending aorta, above the coronary arteries and flush with the origin of the brachiocephalic artery. It was balloon dilated distally. Aortography demonstrated successful exclusion of the proximal dissection, as well as patent coronary and great vessels (Figure 2). Lack of flow into the false lumen and preservation of flow in the coronary arteries was confirmed by transesophageal echocardiography. Partial avulsion and complete dissection of the right external iliac artery was repaired surgically by means of an interposition graft.

The patient recovered in the intensive care unit in stable condition and was extubated the next day. She was transferred to the regular ward on postoperative day 4 and discharged 8 days later. A follow-up spiral CT angiogram confirmed stent-graft position in the ascending aorta between patent coronary and great vessels, no opacification of the false lumen, decreased diameter of the intramural hematoma, increased diameter of the true lumen, resorption of pericardial effusion and mediastinal hematoma, and resolution of several fenestrations an the arch and descending aorta seen on the preoperative scan (Figure 3).

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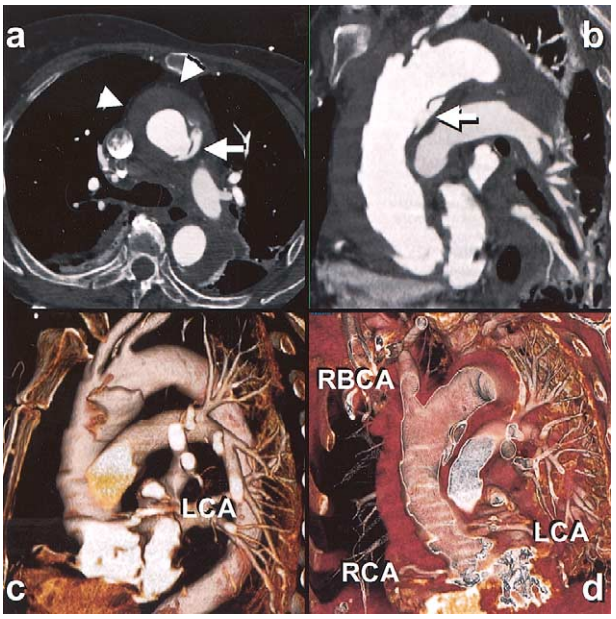

Figure 1. CT angiography before treatment. A, Axial CT image shows intimal tear *(arrow)* in ascending aorta with severe intramural hemorrhage *(arrowheads).* B, Oblique-sagittal reformatted image shows intimal tear *(arrow)* at undersurface of distal ascending aorta. C and D, Three-dimensional volume-rendered images illustrate relationship of left coronary artery *(LCA)* and supra-aortic branches to intimal tear *(arrow). RBCA,* Right brachiocephalic artery; *RCA,* right coronary artery.

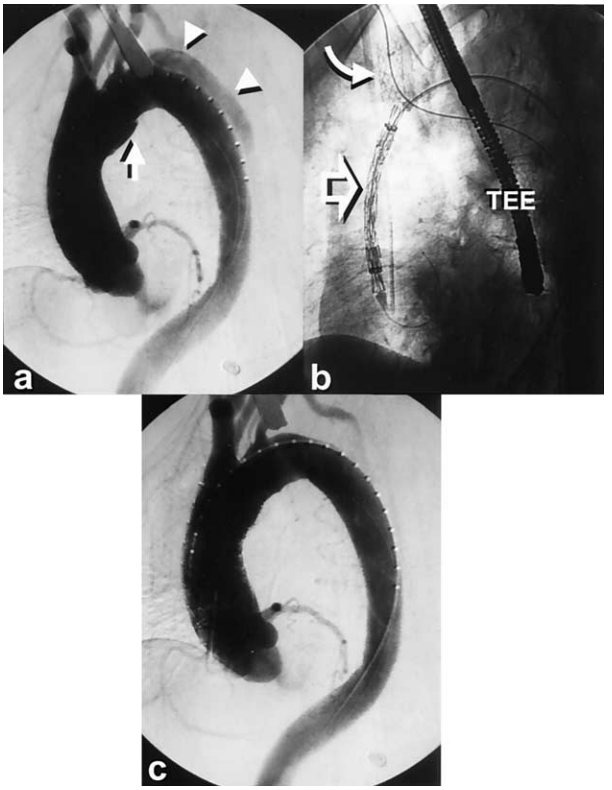

Figure 2. Intra-arterial angiography. A, Digital subtraction angiographic image (left anterior oblique projection) shows interval development of Stanford type A aortic dissection. Intimal tear is seen on undersurface of distal ascending aorta *(arrow).* Faint opacification is visible on false lumen *(arrowheads).* B, Predeployment angiographic image shows stent graft folded on delivery device *(open arrow).* Bare stent is seen in brachiocephalic artery *(curved arrow). TEE,* Transesophageal echocardiographic probe. C, Postdeployment digital subtraction angiographic image shows closure of previous intimal tear *(arrow).* There is no opacification of false lumen.

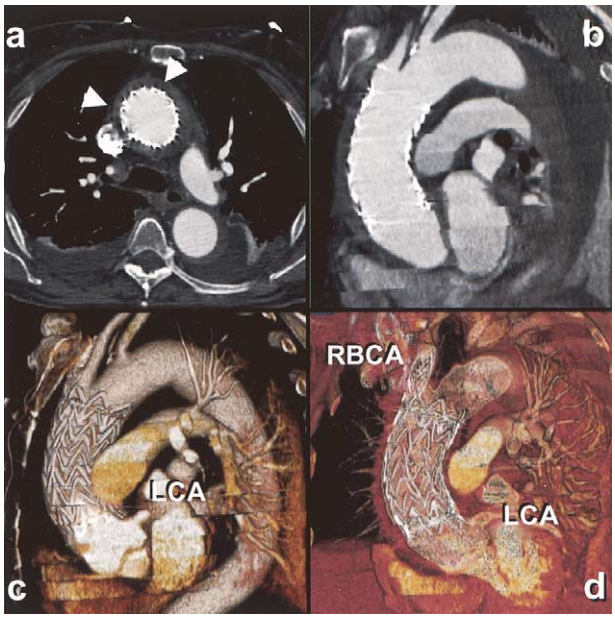

Figure 3. CT angiography after treatment. Axial (A) and oblique-sagittal (B) CT images at same levels as in Figure 1 confirm coverage of intimal tear with aortic stent graft. Note decreased thickness of thrombosed false lumen surrounding thoracic aorta *(arrowheads).* Volume-rendered views (C, D) show relationship of stent graft to left coronary artery *(LCA)* and right brachiocephalic artery *(RBCA).*

Discussion

Emergency surgical replacement of the ascending aorta is still considered the criterion standard therapy for acute type A dissection. Treatment of pathologic conditions of the descending aorta is evolving, especially for high-risk patients. In addition to applications for descending thoracic aneurysms, transection, and giant penetrating ulcers, the use of stent grafts to cover the primary intimal tear in the descending aorta has become a viable and increasingly accepted option.[1,2,4] We report here the successful percutaneous treatment of an acute Stanford type A dissection with a covered stent graft as primary and sole treatment. This alternative was chosen because of the unwillingness of the patient to be subjected to the risk of a surgical intervention.

By applying percutaneous interventional methods precluding sternotomy, thoracotomy, and cardiopulmonary bypass, it seems possible to reduce mortality and morbidity in a highly selected patient group with aortic pathologic conditions.[4] Potential complications of catheter-based interventions are evident.

Another interesting side aspect is the documentation of progression of the disease process from a localized aortic tear with an extensive intramural hematoma to a full-blown aortic dissection within 24 hours, as documented by three imaging techniques. The early result in our case is very encouraging, and the CT scan confirmed achievement of the hemodynamic and anatomic goals associated with successful conventional surgical repair. The durability of stent-graft repair remains to be proven. Further application in highly selected patients seems warranted.

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The dilemma of skeletonized internal thoracic artery sequential bypass versus proximal pedicled in situ internal thoracic artery plus coronary-coronary free internal thoracic artery bypass for multiple lesions of the left anterior descending coronary artery

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We describe a case in which the patient's large left anterior descending coronary artery (LAD) had proximal and distal stenosis. We speculated that a pedicled internal thoracic artery (ITA) graft would not have enough length for sequential bypass. Although the effects of skeletonization of the ITA on its long-term patency has not been established, we decided to use a free, short segment of pedicled left ITA as coronary-coronary bypass over a distal lesion on the LAD. The proximal remnant of left ITA was used as an in situ graft to bypass the proximal stenosis on the LAD. In our opinion, this technique may occasionally be an attractive approach when pedicled ITA is not long enough to be used for sequential bypass grafting.

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Clinical Summary

A 61-year-old man was admitted with progressive angina (New York Heart Association functional class III on admission). Hypertension, smoking, hypercholesterolemia, diabetes mellitus, and family history were all risk factors for coronary artery disease. Cardiac catheterization and angiocardiography revealed good left ventricular function (ejection fraction 0.60) with severe double-vessel disease. There was stenosis (80%) in the mid third of the right coronary artery, 70% stenosis of the proximal LAD, and long (3 cm in length) stenosis as great as 85% on the border zone between mid and distal thirds of the large LAD (Figure 1).

Bypass surgery with pedicled left ITA and vein graft was planned and accomplished. Vein graft was used to bypass the right system lesion. Because there were two stenoses on the LAD, we decided to use a short, free segment of the left ITA to perform a coronary-coronary bypass (proximal and distal connections were done as terminolateral anastomosis) over the distal stenosis. We also used the remnant of in situ left ITA to bypass the proximal LAD stenosis. The aortic crossclamp time was 43 minutes.

The patient's postoperative course and convalescence progressed without any difficulty, and he was discharged with no angina. A predischarge check angiogram done on ninth postoper-