Brief Communications

Complicated acute type B aortic dissection involving the arch: Treatment by simultaneous hybrid approach under local anesthesia

Gabriele Iannelli, MD,[a] Mario Monaco, MD,[a] Luigi Di Tommaso, MD,[b] and Federico Piscione, MD, Naples, Italy

See related editorial on page 1201

We herein report the case of a high-risk patient with complicated acute type B aortic dissection (B-AD) involving the arch up to both common iliac arteries. The patient was treated by a simultaneous hybrid approach accomplished with local anesthesia.

Clinical Summary

A 56-year-old man was admitted to the emergency care unit for chest pain and hypertension because of an acute B-AD involving the distal arch, left subclavian artery (LSA), visceral vessels, and the abdominal aorta up to both common iliac arteries (Figure 1). An ascending aortic aneurysm, with a maximum diameter of 42 mm, was also found. An emergency surgical option was considered because of the substantial risk of impending rupture of the false lumen, highlighted by the persistence of chest pain and unresponsive hypertension. Our strategy consisted of a simultaneous hybrid treatment.

Intraprocedural angiography was achieved through the right radial artery, and both radial arterial pressures were monitored. The common carotid arteries were exposed at the neck under local anesthesia, and an 8-mm prosthetic bypass graft (Gelsoft Plus; Vascutek Ltd, Inchinnan, Scotland) was placed between the right and left carotid arteries. To avoid a reflux endoleak, we ligated the left common carotid artery proximal to the bypass graft. An angiogram confirmed patency of the prosthetic bypass graft and satisfactory supply to the circle of Willis. Femoral arterial access was subsequently achieved, also under local anesthesia. The endograft was loaded onto an extra-stiff guidewire and then advanced up to the aortic arch. Mean blood pressure was maintained at 60 mm Hg or higher. The extensive coverage from the origin of the brachiocephalic artery to the celiac axis was performed by 3 cone-shaped Valiant stent grafts (Medtronic Inc, Santa Rosa, Calif) of increasing diameters inserted into the previous stent: the proximal endoprosthesis diameter was 44–40 mm, the intermediate 42–38 mm, and the third 40–36 mm. Each one was 150 mm in length. Completion aortography documented the absence of endoleaks, patency of the brachiocephalic artery and visceral vessels, and overstenting of the left common carotid and LSA arteries, with a gradient of approximately 37 mm Hg in systolic blood pressure between the right and the left arms. No steal phenomena, left arm ischemia, or cerebrovascular accident occurred. The patient was discharged on the fifth postoperative day. At 6 months follow-up, the patient did well, and a computed tomographic scan confirmed patency of the prosthetic bypass graft and complete thromboexclusion of the false lumen (Figure 2). Close monitoring of the dissected abdominal aorta and of the ascending aortic aneurysm was planned.

Discussion

To decrease the high risks of mortality and neurologic complications associated with conventional surgery under general deep anesthesia, we opted for endovascular stent-graft repair of B-AD because this offers the advantages of excluding the false lumen and avoiding prolonged proximal aortic clamping and cardiopulmonary bypass.[1,2]

Primary revascularization of the left common carotid artery was required to achieve an adequate proximal landing zone.[3] In our case, a prosthetic bypass graft between the right and left common carotid arteries was accomplished under local anesthesia. Overstenting of the

From the Departments of Cardiac Surgery,[a] and Cardiology,[b] University "Federico II," Naples, Italy.

Received for publication March 20, 2007; accepted for publication April 19, 2007.

Address for reprints: Gabriele Iannelli, MD, Via Santo Strato, 8, 80123 Naples, Italy (E-mail: gabrieleiannelli@libero.it).

J Thorac Cardiovasc Surg 2008;135:1380-2

0022-5223/$34.00

doi:10.1016/j.jtcvs.2007.04.077

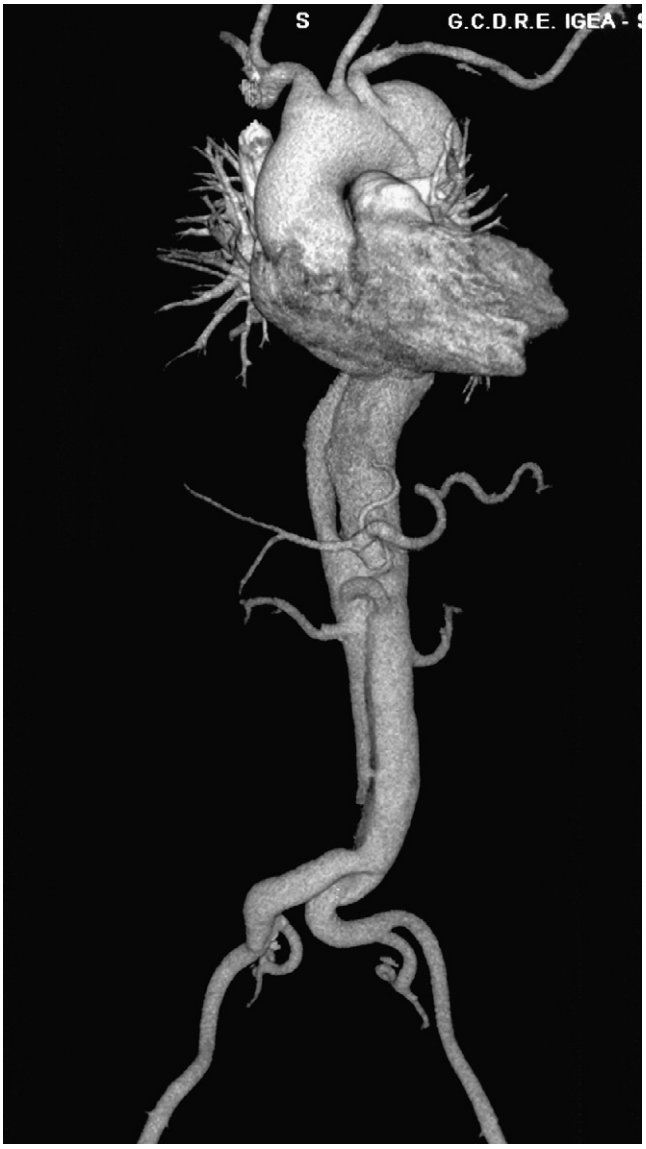

Figure 1. Multislice spiral computed tomographic angiogram shows the dissection involving the distal arch, left subclavian artery, visceral vessels, and the abdominal aorta up to both common iliac arteries.

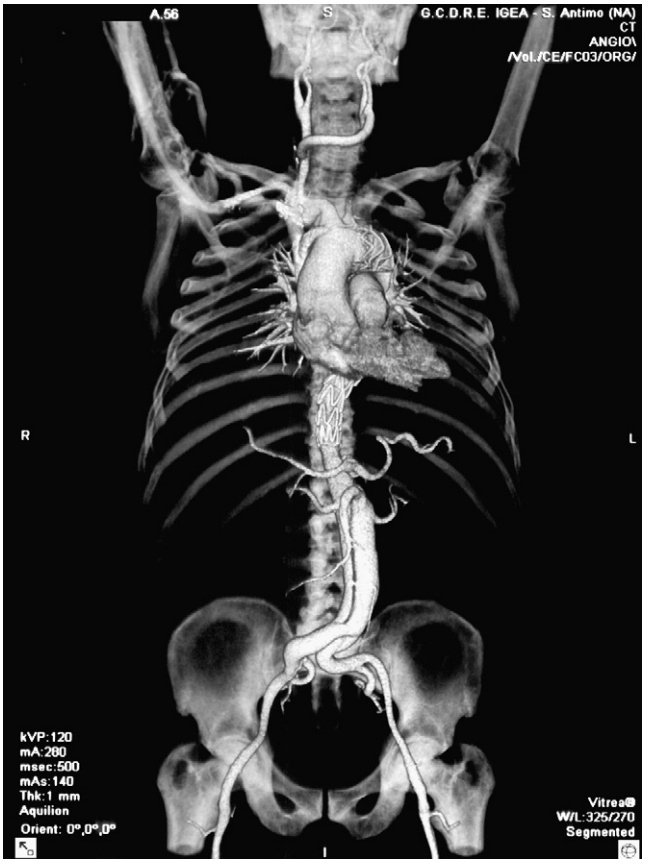

Figure 2. Six months follow-up computed tomographic scan confirmed patency of the prosthetic bypass graft and the complete thromboexclusion of the false lumen.

LSA was safely performed without primary revascularization after an accurate evaluation of the supply to the circle of Willis by means of a spiral computed tomographic angiogram and intraoperative conventional arteriography.

No neurologic complications occurred despite the extensive coverage of the entire aortic arch and descending thoracic aorta from the brachiocephalic artery orifice to the origin of the celiac axis.

Contemporary studies assess the risk of paraplegia after conventional surgical repair of the descending thoracic aorta to be between 7% and 36%[4]: some authors recommend adjunctive techniques, such as spinal fluid drainage, to prevent paraplegia, whereas others consider such techniques to be superfluous.[5] Otherwise, as reported by a recent meta-analysis on acute B-AD,[4] the endovascular aneurysm repair strategy significantly decreases the risk of paraplegia, between 0% and 3.4% (mean 0.8% $\pm$ 0.4%).

An innovative aspect of this technique is the extensive coverage of the arch and entire descending thoracic aorta, achieved under local anesthesia. No case to date has been reported on the simultaneous hybrid treatment of acute B-AD without general anesthesia.

Close monitoring of the dissected abdominal aorta and of the ascending aortic aneurysm is recommended. This hybrid approach does not preclude the possibility of a secondary endovascular aneurysm repair of the infrarenal abdominal aorta or conventional surgery of the ascending aortic aneurysm if and when required.

This technique offers the option of less invasive treatment to a greater number of patients with severe thoracic aortic disease who would otherwise be exposed to the high risk of conventional surgery, cardiopulmonary bypass, and general deep anesthesia.

References

1. Trimarchi S, Nienaber CA, Rampoldi V, Myrmel T, Suzuki T, Bossone E, et al., IRAD Investigators. Role and results of surgery in acute type B aortic dissection: insights from the International Registry of Acute Aortic Dissection (IRAD). *Circulation*. 2006;114(1 Suppl):I357-64.

2. Dietl CA, Kasirajan K, Pett SB, Wernly JA. Off-pump management of aortic arch aneurysm by using an endovascular thoracic stent graft. *J Thorac Cardiovasc Surg*. 2003;126:1181-3.
3. Criado FJ, Clark NS, Barnatan MF. Stent graft repair in the aortic arch and descending thoracic aorta: a 4-year experience. *J Vasc Surg*. 2002;36: 1121-8.
4. Eggebrecht H, Nienaber CA, Neuhauser M, Baumgart D, Kische S, Schmermund A, et al. Endovascular stent-graft placement in aortic dissection: a meta-analysis. *Eur Heart J*. 2006;27:489-98.
5. Sullivan TM, Sundt TM 3rd. Complications of thoracic aortic endografts: spinal cord ischemia and stroke. *J Vasc Surg*. 2006;43(Suppl A): 85A-8A.

Transmitral endocavitary repair of inferior left ventricular pseudoaneurysm: A simplified approach in patients requiring concomitant mitral valve surgery

Pranava Sinha, MD, Praveen Varma, MD, Amit Korach, MD, and Oz M. Shapira, MD, Boston, Mass

Left ventricular pseudoaneurysms (LVPAs) arise from contained myocardial rupture after acute myocardial infarction. Their propensity to rapid enlargement and rupture mandates expeditious surgical management.[1] We report a case of LVPA repair through an endocavitary transmitral approach in a patient undergoing concomitant mitral valve surgery.

Clinical Summary

An 82-year-old man with a history of two myocardial infarctions and ischemic cardiomyopathy was seen with congestive heart failure and angina. Transthoracic echocardiography demonstrated dilated left ventricle, left ventricular ejection fraction of 30%, a large inferior LVPA (Figure 1, *A*), and severe ischemic mitral regurgitation. Cardiac magnetic resonance imaging confirmed the presence of a 63 × 58 × 41-mm inferior LVPA adjacent to the mitral valve (Figure 1, *B*). Coronary angiography showed severe three-vessel disease.

The operation was performed though a median sternotomy incision with cardiopulmonary bypass. Four-vessel coronary artery bypass grafting was performed initially.

There were dense adhesions along the diaphragmatic surface of the heart. The pseudoaneurysm sac was densely calcified and adhered to the inferior vena cava. Because we needed to address the severe mitral regurgitation, and to avoid a ventriculotomy, an endocavitary approach to the LVPA was selected. The mitral valve could not be repaired because of the extensive pathology of the subvalvular apparatus. The posterior mitral valve leaflet was detached, affording excellent exposure of the neck of the LVPA. The LVPA was excluded from the left ventricle by closing the neck with a patch of glutaraldehyde-fixed bovine pericardium (Peri-Guard; Synovis Life Technologies, Inc, St Paul, Minn) sutured in place with interrupted, pledgeted sutures. The mitral valve was replaced with a bioprosthesis, preserving the anterior chordae.

The patient recovered uneventfully. Predischarge transthoracic echocardiography and magnetic resonance imaging showed a satisfactory repair with an intact pericardial patch, partially thrombosed aneurysmal sac, markedly improved left ventricular function, and no mitral regurgitation (Figure 2). At 6-month follow-up, the patient was doing well and in New York Heart Association functional class I.

Discussion

LVPAs are formed as a result of contained myocardial rupture after acute myocardial infarction. In contrast with true ventricular aneurysms, LVPAs have a high propensity to rapid enlargement and rupture, mandating expeditious surgical management.[1]

Repair of LVPA is commonly performed with a patch sutured through a ventriculotomy made in the LVPA wall.[2] This approach can be technically challenging because of dense pericardial adhesions, adhesion of the sac to adjacent structures (such as the inferior vena cava in our case), calcification of the sac, and a friable ventriculotomy suture line.

The transmitral endocavitary approach for repair of LVPA has been previously reported in isolated cases.[3,4] This approach is particularly useful for patients with concomitant mitral valve disease that necessitates repair or replacement of the valve. With this approach, we gained a wide exposure of the aneurysm neck and were able to achieve an excellent repair with restoration of left ventricular geometry while avoiding a ventriculotomy.

In our case, the mitral valve had to be replaced. if the mitral valve is competent or suitable for repair, however, transmitral repair of the LVPA can be accomplished with preservation of the mitral valve by reattaching the posterior leaflet to the annulus after suturing the patch.

In summary, the endocavitary transmitral approach is a safe and effective technique. It should be considered for repair of inferior LVPA in patients who require concomitant mitral valve surgery.

From the Department of Cardiothoracic Surgery, Boston Medical Center, Boston, Mass.

Received for publication Oct 16, 2007; accepted for publication Dec 12, 2007.

Address for reprints: Oz M. Shapira, MD, Department of Cardiothoracic Surgery, Hadassah Medical Center PO Box 12000, Ein Kerem Jerusalem, 91120 Isreal Tel (+972) 2 677 6960 / 1 Fax (972) 2 643 8005 (E-mail: ozshapira@Hadassah.org.il).

J Thorac Cardiovasc Surg 2008;135:1382-3

0022-5223/$34.00

doi:10.1016/j.jtcvs.2007.12.006