Case Reports

A Late Sequela of the David Procedure:

Left Main Coronary Artery Compression and Myocardial Infarction due to Pseudoaneurysm Formation

Mehmet Baran Karatas, MD
Abdullah Kemal Tuygun, MD
Baris Gungor, MD
Seviye Bora Sisman, MD
Sinan Sahin, MD
Osman Bolca, MD

Valve-sparing root replacement (the David procedure) is a valuable alternative to conventional aortic root replacement with a composite graft, especially in patients whose aortic valve leaflets have not been altered. However, reintervention rates are higher than are those associated with composite graft implantation. In this report, we present the case of a patient who had undergone valve-sparing root replacement 2 years earlier and was admitted to our hospital with myocardial infarction and cardiogenic shock secondary to coronary ostial button dissection, aortic pseudoaneurysm formation, and severe left main coronary artery compression. To our knowledge, this case is exceedingly rare. Rather than attempt local reconstruction of the mouth of the pseudoaneurysm, we excised the lesion, the aortic valve, and the graft, and we successfully implanted a composite aortic graft with a mechanical aortic valve. ***(Tex Heart Inst J 2016;43(1):49-51)***

Key words: *Aneurysm, false; aorta; left main coronary artery; male; myocardial infarction; reoperation*

From: *Departments of Cardiology (Drs. Bolca, Gungor, and Karatas), Cardiovascular Surgery (Dr. Tuygun), and Radiology (Drs. Sahin and Sisman), Siyami Ersek Thoracic and Cardiovascular Surgery Center, Training and Research Hospital, 34087 Istanbul, Turkey*

Address for reprints: *Mehmet Baran Karatas, MD, Department of Cardiology, Siyami Ersek Thoracic and Cardiovascular Surgery Center, Training and Research Hospital, Tibbiye St., 34087 Uskudar, Istanbul, Turkey*

E-mail: *karatasbaran@gmail.com*

Valve-sparing root replacement (VSRR, the David procedure) is a valuable alternative to conventional aortic root replacement (with a composite graft), especially in patients whose aortic valve leaflets have not been altered.[1,2] Even in patients with congenital abnormalities like Marfan syndrome or bicuspid aortic valve, VSRR is accepted as an effective treatment.[3] However, reintervention rates are higher than are those associated with composite graft implantation. In this report, we present the case of a patient who had undergone VSRR 2 years before his admission to our hospital with myocardial infarction and cardiogenic shock secondary to aortic pseudoaneurysm (APA) formation and left main coronary artery (LMCA) compression.

Case Report

A 67-year-old man with a 6-hour history of dyspnea was admitted to our emergency department. Two years before, he had received a diagnosis of ascending aortic aneurysm and chronic aortic dissection and had undergone aortic root replacement. His aortic root had been 32 mm in diameter, and his ascending aorta 60 mm. From his operative report, we learned that a remodeling-type David operation had been performed: the coronary artery buttons had been displaced 1 cm, and a 32-mm Dacron prosthetic graft had been used.

On physical examination, the patient had a blood pressure of 90/50 mmHg, a heart rate of 110 beats/min, and crackles in the bases of both lungs. His electrocardiogram revealed pathologic Q waves in leads V_1 through V_3. His echocardiogram showed hypokinesia of the mid and apical segments of the anteroseptal and anterior left ventricular (LV) wall. His cardiac biomarkers were highly compatible with myocardial infarction.

We performed emergency coronary angiography via the femoral artery. During selective cannulation of the LMCA, the left Judkins catheter entered a fistulous connection at the left sinus of Valsalva and thereby revealed a pseudoaneurysm (Fig. 1). The ostium of the LMCA was compressed beneath this structure, which resulted in severe arterial stenosis (Fig. 1). Flow was impaired distally in the left anterior descending and left circumflex coronary arteries. The right coronary artery was normal. We terminated the procedure and performed emergency computed tomography with 3-dimensional reconstruction; this showed an APA (2.2 × 1.1 cm in diameter) that originated adjacent to the ostium of the LMCA (Figs. 2–4).

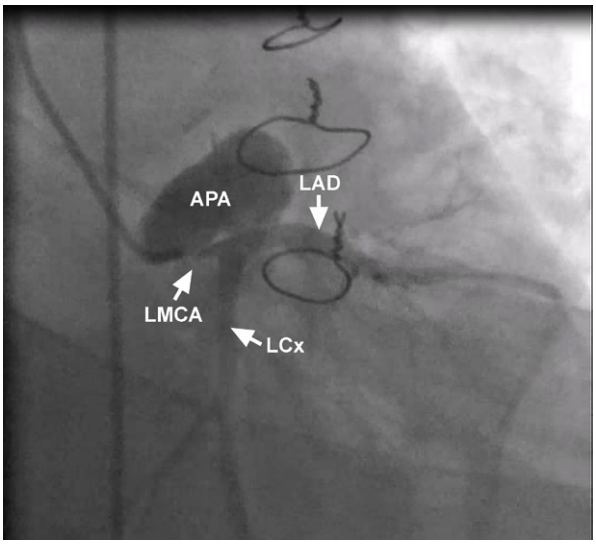

Fig. 1 *Coronary angiography (caudal view) shows an aortic pseudoaneurysm (APA) just above the left main coronary artery (LMCA). Compression by the APA has caused critical stenosis in the LMCA.*

LAD = left anterior descending coronary artery; LCx = left circumflex coronary artery

Supplemental motion image is available for Figure 1.

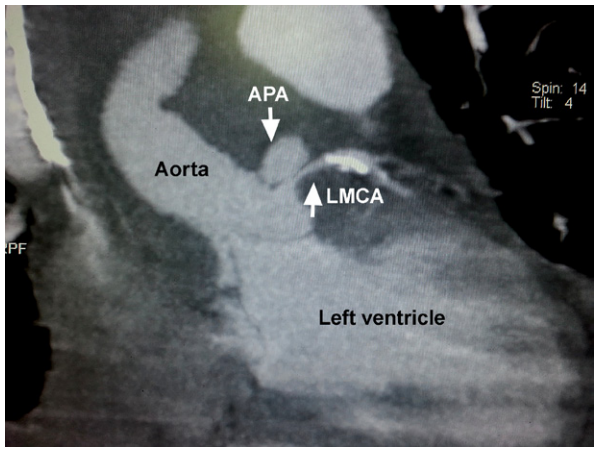

Fig. 2 *Two-dimensional computed tomogram shows the aortic pseudoaneurysm (APA) originating from the proximal edge of the coronary ostial button and extending through the left main coronary artery (LMCA), causing critical obstruction (the white mass in the LMCA is calcification).*

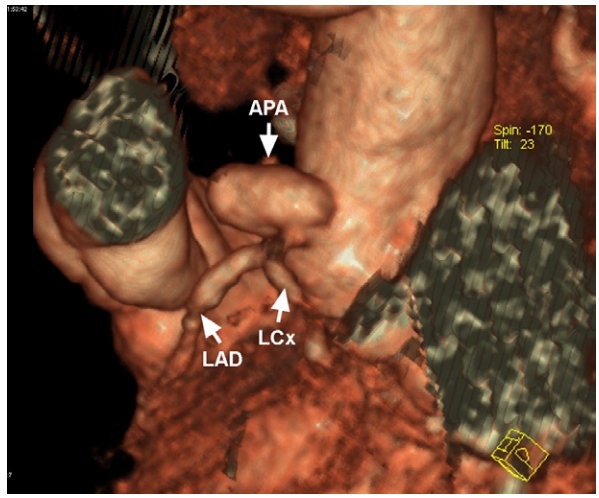

Fig. 3 *Computed tomogram with 3-dimensional reconstruction shows the aortic pseudoaneurysm (APA) from the posterior aspect of the heart.*

LAD = left anterior descending coronary artery; LCx = left circumflex coronary artery

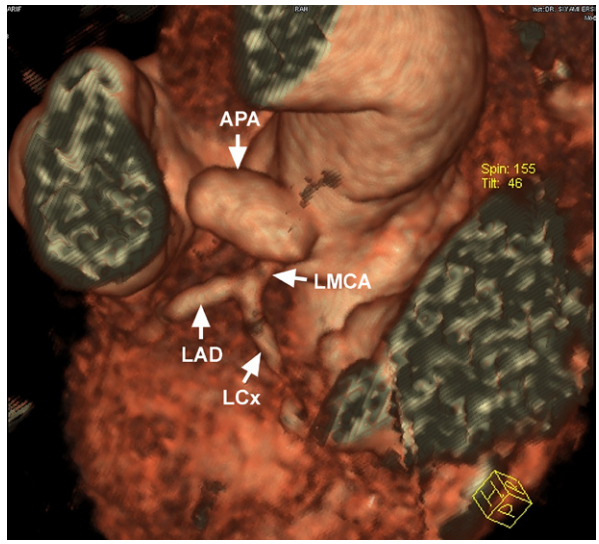

Fig. 4 *Computed tomogram with 3-dimensional reconstruction shows the aortic pseudoaneurysm (APA) from the posterior aspect with cranial angulation.*

LAD = left anterior descending coronary artery; LCx = left circumflex coronary artery; LMCA = left main coronary artery

The patient was immediately taken to the operating room. Upon detaching the LMCA ostial button from its proximal edge, we saw an APA originating from this site and extending laterally above the LMCA. When the aortic valve leaflets were retracted, tiny nodular structures resembling vegetations were seen on the ventricular surface of the leaflets. The pressing nature of this operation did not permit time to rule out infective endocarditis; therefore, rather than attempt local reconstruction of the mouth of the APA, we excised the APA, the aortic valve, and the graft, and we implanted a composite aortic graft with a mechanical aortic valve. The blood cultures and a culture of the operative material did not yield any specific microorganism. However, the patient was given antibiotic therapy during his 10 days of hospitalization. Follow-up echocardiography 4 weeks after dismissal from the hospital revealed a properly functioning prosthetic aortic valve and normal LV systolic function.

Discussion

Aortic VSRR is an effective means of treating aortic root dilation in patients who do not have aortic valve defects. During a 12-year follow-up period, the reoperative and long-term survival rates have been reported as 94.3% ± 2.6% and 82.9% ± 3.7%, respectively.[1] Aortic insufficiency is the chief indication for reintervention. Aortic pseudoaneurysm formation is a rare and silent complication that might not be diagnosed until severe symptoms develop. Aortic pseudoaneurysms can occur after the David or the Bentall operation.[4] From a group of 31 patients who underwent reoperation after composite graft implantation, Raanani and colleagues[5] reported the cases of 2 patients with the indication of pseudoaneurysm formation. Mohammadi and co-authors[6] reported 12 APA cases among 202 (5.9%) patients who underwent aortic root replacement for aortic dissection and 3 cases among 683 (0.4%) patients who underwent operation for other indications. In our patient, the initial diagnosis was chronic aortic dissection, which increases the risk of APA. The anatomic location and the presence or absence of fistulous connections to the surrounding tissues can result in widely different symptoms in patients with APA. To our knowledge, this is an exceedingly rare case of severe LMCA compression and cardiogenic shock secondary to an APA that originated from the coronary ostial button. Coronary angiography and computed tomography were used to diagnose this rare sequela. In summary, emergency surgery resulted in restoration of the coronary flow and in normalization of LV systolic function. A composite graft with a mechanical aortic valve was implanted.

Conclusion

Aortic pseudoaneurysm formation is a rare but severe sequela of David's operation, which can present as coronary artery compression, myocardial infarction, or both.

Acknowledgments

We thank Dr. Tolga Onuk and Dr. Ahmet Taha Alper for their contributions to the case.

References

1. David TE, Maganti M, Armstrong S. Aortic root aneurysm: principles of repair and long-term follow-up. J Thorac Cardiovasc Surg 2010;140(6 Suppl):14-9.
2. de Oliveira NC, David TE, Ivanov J, Armstrong S, Eriksson MJ, Rakowski H, Webb G. Results of surgery for aortic root aneurysm in patients with Marfan syndrome. J Thorac Cardiovasc Surg 2003;125(4):789-96.
3. Patel ND, Weiss ES, Alejo DE, Nwakanma LU, Williams JA, Dietz HC, et al. Aortic root operations for Marfan syndrome: a comparison of the Bentall and valve-sparing procedures. Ann Thorac Surg 2008;85(6):2003-11.
4. Omeroglu SN, Mansuroglu D, Goksedef D, Cevat Y. Ultrafast computed tomography in management of post-Bentall aortic root pseudoaneurysm repair. Tex Heart Inst J 2005;32 (1):91-4.
5. Raanani E, David TE, Dellgren G, Armstrong S, Ivanov J, Feindel CM. Redo aortic root replacement: experience with 31 patients. Ann Thorac Surg 2001;71(5):1460-3.
6. Mohammadi S, Bonnet N, Leprince P, Kolsi M, Rama A, Pavie A, Gandjbakhch I. Reoperation for false aneurysm of the ascending aorta after its prosthetic replacement: surgical strategy. Ann Thorac Surg 2005;79(1):147-52.