Case Report

Severe Mitral Regurgitation Coexisting with Descending Thoracic Aorta Aneurysm: Staged Approach Using Endovascular Repair

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We describe the case of a 67-year-old man who was referred for the management of severe mitral valve regurgitation and coronary artery disease. Further workup revealed a descending thoracic aorta aneurysm. He underwent mitral valve replacement with coronary artery bypass surgery and, at a second stage, endovascular stent graft repair of the descending thoracic aorta aneurysm.

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Recent evolutions in cardiac surgery have contributed to improved outcomes regarding the mortality and morbidity in patients undergoing operations concerning pathologies of the thoracic aorta. However, patients with significant comorbidities may develop serious complications after such operations.[1] Endovascular implantation of a stent graft is an alternative therapeutic choice, with effective short-term and intermediate results and low rates of morbidity and mortality.[2-4] We describe the case of a high-risk patient who underwent staged repair with an endovascular stent graft of a descending thoracic aorta aneurysm after surgical treatment of the mitral regurgitation (MR) and coronary artery disease (CAD).

Case presentation

A 67-year-old man, heavy smoker, obese and with a history of mitral valve prolapse, was diagnosed with severe MR and was referred for surgery. His past medical history included arterial hypertension and severe chronic obstructive pulmonary disease. Cardiac echocardiographic examination revealed mitral valve prolapse with myxomatous degeneration of both anterior and posterior cusps and severe mitral regurgitation (4+/4+) with a dilated left ventricle (left ventricular end diastolic diameter 65 mm) and impaired systolic function (ejection fraction was 40%). The coronary angiogram showed 90% ostial stenosis of the left anterior descending artery. Computerized tomography (CT) of the chest also revealed an aneurysm of the descending thoracic aorta with a diameter of 7.9 cm (Figure 1).

Based on his comorbidities and his clinical condition, it was decided to proceed with the correction of the mitral regurgitation and CAD first. The mitral valve was replaced with a mechanical valve ATS type No 29 (extensive myxomatous degeneration of both valve leaflets) with preservation of the subvalvular apparatus, and the left internal thoracic artery was anastomosed to the left anterior descending. Due to his poor respiratory performance (preoperative FEV_1 55% of the predicted value), he remained intubat-

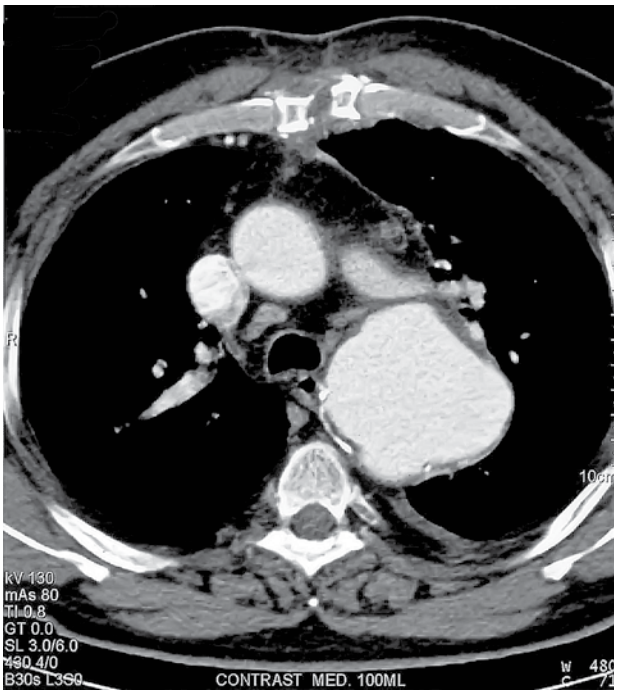

Figure 1. Preoperative CT depicting the aneurysm in the descending thoracic aorta.

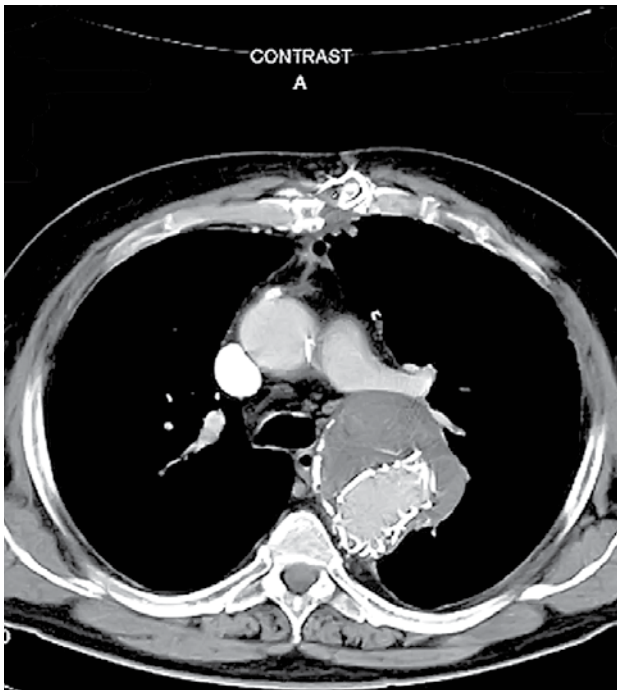

Figure 2. Postoperative CT depicting the endovascular stent graft without any presence of endoleak.

ed for 4 days. After extubation, he was transferred to the ward, where he needed intensive respiratory physiotherapy. He was discharged from the hospital after 15 days.

Due to the patient's compromised respiratory status and his comorbidities, it was decided that management of the aneurysm would be undertaken using the endovascular technique, after 3 months. Under general anesthesia the left brachial artery and both femoral arteries were exposed. A catheter with a wire guide was inserted through the brachial artery up to the junction of the left subclavian artery to the thoracic aorta under fluoroscopy. The left common femoral artery was occluded with clamps and a 22 F sheath with the endovascular stent graft was inserted and deployed to cover the aneurysm, with special care to avoid occlusion of the left subclavian artery. Subsequent administration of contrast confirmed the absence of an endoleak. The patient was transferred to the intensive care unit (ICU), where he was extubated shortly after and stayed there for a few hours. He was discharged from the hospital after 4 days. A CT prior to discharge showed the stent graft in a good position without any endoleak or rupture. Twelve months later the patient is in an excellent clinical condition and CT confirmed the previous findings (Figure 2).

Discussion

In this case, we decided to correct the patients cardiac problem first and then to deal with his aneurysm. Based on his comorbidities and his compromised respiratory status we favored endovascular repair.

The endovascular technique has been used to treat thoracic aortic pathology with satisfactory results. This technique involves the insertion of a stent graft through the common femoral artery by cut-down or percutaneously. The cut-down technique is mostly used, because the delivery sheath for the endoprosthesis is usually large (20 French or bigger) and the artery frequently needs repair. The contralateral common femoral artery is then accessed percutaneously. Occasionally, the brachial artery is needed to assist with the delivery of the device or to perform coil embolization of the left subclavian artery.[5] The advantages of this method are a shorter operation, with avoidance of long anesthesia and a prolonged postoperative course. Furthermore, the patient's recovery is shorter and return to normal activities is faster. In our case, the procedure was successfully performed in less than 1 hour. The patient stayed in the ICU for few hours and was discharged 4 days later.

The first report of endovascular therapy for descending thoracic aortic pathology was in 1994 by Da-

ke et al.[6] Interventional management of thoracic aneurysms is expected to be more beneficial compared with abdominal aneurysms, due to the high morbidity rates that accompany the surgical treatment of thoracic aneurysms. Endovascular thoracic stent grafting includes cases of acute or chronic aortic dissection, atherosclerotic aneurysms, traumatic injuries, pseudoaneurysms, aorto-bronchial fistulas and coarctation of the aorta.[2,7-9] In the literature, reported perioperative mortality/morbidity rates and cardiopulmonary complications are much fewer compared with the open surgical procedures.[3,4] Although neurological injury due to spinal cord ischemia can occur, various studies support the view that the risk is much lower than for the open procedures.[3,10] The incidence of stroke is reported to be 3.5%. It is believed to occur secondary to atheromatous lesions in the aorta and the wire/catheter manipulations that take place during the procedure. The risk of acute renal failure is lower than with the open procedure.[2] The fate of the aneurysm sac is variable. It may be reduced in size, remain stable or, rarely, increase. Makaroun et al reported in a 2-year follow up that the aneurysm sac decreased in size in 38% of the patients, whereas in 11% it increased, mainly due to the presence of endoleak.[3]

Undoubtedly, all patients who undergo endovascular stent graft placement should be monitored for the development of potential complications, such as endoleak, stent fracture and graft migration.[11] Endoleak is a well-discussed issue, mainly in the cases of abdominal aneurysms. It is defined as blood flow outside the stent graft lumen but within the aneurysm sac.[12] Endoleaks are classified into five categories (type I, II, III, IV, V) based on the source of the blood flow.[13] Current studies showed that endoleaks related to thoracic aneurysms are presented in a range from 5% to 20%.[12] The diagnosis is made by CT, although magnetic resonance imaging seems to play a significant role in detecting complications as well as in future follow up. After the diagnosis and classification is made, most of them are managed with endovascular techniques. In some of them simple follow up is required (endoleak type II).[12] Trivial endoleaks may close spontaneously.[2]

Endovascular stent graft placement requires adequate sized vascular access, and for this reason we placed a 22 F sheath in the femoral artery. Complications regarding vascular access are common. Femoral and iliac artery rupture/dissection, retroperitoneal hematomas, and arterial embolism, are some that have been reported in the literature.[2,15]

Some specific late complications regarding the particular anatomy of the thoracic cavity have also been observed, including aortic wall perforation, device collapse, metal fracture and suture breakage, pseudocoarctation syndrome, and delayed reperfusion of false lumen. The last two complications have been observed in cases of aortic dissection repair,[14] but all of these are extremely rare and are discussed in the literature as case reports. Technological evolution in the design and manufacture of new endovascular devices and optimal patient selection will probably eliminate these problems.

The short-term and intermediate results of patients who undergo endovascular treatment for aneurysms in the descending aorta are very encouraging, with low complication rates compared with surgery. In our patient, endovascular repair was the treatment of choice, in order to eliminate the increased perioperative risk with the open technique. Longer follow up is warranted to evaluate the long-term results.[2-5,9,10,15] In parallel, the evolution of technology will allow the elimination of technical complications and the expansion of its clinical application.

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