A 60-YEAR-OLD man with a history of recent heart failure caused by both primitive and ischemic dilated cardiomyopathy underwent the successful implantation of a left ventricular assist device (Novacor LVAS; WorldHeart, Ottawa, ON, Canada) under cardiopulmonary bypass. Intraoperative transesophageal echocardiography (TEE) performed immediately after implantation showed the correct placement of both the inflow and the outflow grafts (Fig 1) and the absence of any aortic regurgitation or aortic valve pathology. His immediate postoperative course was uneventful, and no right ventricular assistance was needed. A routine follow-up transthoracic echocardiogram performed in the intensive care unit on postimplantation day 9 disclosed mild central aortic regurgitation along with a mild pericardial effusion. Another transthoracic echocardiogram performed on postimplantation day 15 showed an aggravation of both the aortic regurgitation and the pericardial effusion.

Clinically, the patient was asymptomatic and had no fever or signs of peripheral hypoperfusion. Because the magnitude of the aortic insufficiency could preclude the correct functioning of the Novacor device and limit forward cardiac output, it was decided to explore the patient 16 days after the left ventricular assist device (LVAD) implantation in order to repair his aortic valve. The patient was thus brought to the operating room where a TEE was performed under general anesthesia, confirming grade III aortic regurgitation (Fig 2). What is the etiology of the aortic regurgitation seen in Figure 2?

![Fig 1. TEE. Midesophageal aortic valve long-axis view, showing the competent aortic valve, the ascending aorta, and the Novacor outflow graft.](image)

![Fig 2. TEE. Upper esophageal left ventricular outflow tract long-axis view, showing grade III aortic regurgitation.](image)
DIAGNOSIS: TYPE II AORTIC DISSECTION WITH ENTRY AT THE LEVEL OF THE OUTFLOW GRAFT

Careful TEE evaluation of the aortic valve and the ascending aorta disclosed an intimal flap strictly limited to the ascending aorta between the aortic valve and the proximal aortic arch (type II of the DeBakey classification) (Figs 3 and 4). Surgical opening and evaluation of the ascending aorta confirmed this finding. The left and noncoronary leaflets were dissected over to the annulus, causing the observed aortic regurgitation. Both coronary arteries were dissected.

Acute aortic dissection is a well-known complication of arterial cannulation for cardiopulmonary bypass, especially in hypertensive patients. Such a complication has been only rarely described after LVAD placement but can lead to serious hypoperfusion and ischemia and even to the patient’s death.1,2 This is the authors’ first case in a series of 24 Novacor-implanted patients.3

The anastomotic site of the outflow graft to the ascending aorta is a fragile area in which an intimal and/or medial tear could appear. Other explanations for such late aortic dissection are intramural hemorrhage because of the rupture of vasa vasorum or the pulsatile pattern of the high-pressure changes applied to anastomosis by the device. The orientation of the outflow graft relative to the ascending aorta is also an important parameter. A perpendicular anastomosis could provoke a turbulent flow and high stress against the posterior wall of the aorta, whereas a more oblique suture could better align both the ejection flow from the Novacor and the flow into the ascending aorta.

Another cause of late aortic regurgitation after LVAD placement could be infective endocarditis. Destruction of the aortic valve by vegetations or an abscess could also preclude its correct closure, leading to a regurgitant flow into the left ventricle. In any case, such a moderate or even severe aortic insufficiency should be surgically corrected to prevent the LVAD to function in a closed circulatory loop with aggravation of the left ventricular dilatation and no effective cardiac output.

Any preexisting incompetent aortic valve should be repaired before or during LVAD implantation. Intraoperative use of TEE is therefore of paramount importance before, during, and after placement of ventricular assist devices.4,5 Because of the risk of thrombosis of the valve and ensuing leaflet blockade or embolism, it has been recommended to close a mechanical valve by oversewing a Dacron patch.6 Another option could be to replace the mechanical aortic valve by a bioprosthesis.

In the present case, surgery consisted in patch closure of the aortic valve, resection of the dissected ascending aorta, and end-to-end anastomosis of the LAVS outflow graft on the repaired ascending aorta just before the innominate artery origin. Two saphenous grafts were implanted from the outflow graft to the proximal right coronary artery and to the ostium of the left main coronary artery.7 The surgeons chose this repair technique because no ventricular recovery was expected and to minimize the risks of further lesions of the fragile tissues and postoperative bleeding. After an 18-day stay in the intensive care unit, the patient was discharged home on the 47th postoperative day and was successfully transplanted after 91 days of ventricular assist device support.

REFERENCES

Fig 3. TEE. Midesophageal aortic valve long-axis view.
Fig 4. TEE. Midesophageal aortic short-axis view.