

Implantation of the HeartMate III Left Ventricular Assist Device in a Giant Left Ventricular Aneurysm Is Left Ventricular Reconstruction Mandatory?

Sotirios Spiliopoulos, MD; Andrae Wasler, MD; Friedrich Fruehwald, MD;
Klemens Ablasser, MD; Gergana Stoschitzky, MD; Otto Dapunt, MD

Left ventricular (LV) assist device implantation is considered to be a therapeutic option only in highly selected cases of giant LV aneurysm because of concerns regarding tissue consistence, potential mobilization of intracardiac thrombotic material, and thrombogenic properties of aneurysmal tissue.¹ To facilitate secure placement of the inflow cannula, avoid embolic events, and attain LV remodeling, implantation of the device is performed in combination with LV reconstruction.

Patient Presentation

A 51-year-old, white male patient was admitted for evaluation of an end-stage heart failure because of ischemic cardiomyopathy. Echocardiographic examination revealed severe systolic dysfunction (LV ejection fraction of 10%), significant thrombus in the giant LV aneurysm, and a contained apical wall rupture resulting from acute myocardial infarction (Figure). Despite interventional revascularization of the left anterior descending artery with a drug-eluting stent and medical therapy, including inotropic support, the patient continued to decline to functional New York Heart Association class IV, Interagency Registry for Mechanically Assisted Circulatory Support level 2. Surgical options were limited. Conventional surgical excision of the aneurysm was deemed unlikely to be successful. Orthotopic heart transplantation on inotrope support seemed to be unrealistic, given the long waiting time because of limited availability of donors. Finally, the option of implementing total artificial therapy was dismissed by the patient and his relatives. We instead decided to perform implantation of the HeartMate III device (Thoratec Inc) as a bridge to transplantation.

Surgical Procedure

The HeartMate III device was conventionally implanted as an LV assist device. We chose to place the inflow cannula at the perforation site, just laterally to the LV apex. After removal of the core, ventricular cavity was inspected and thrombotic material adherent to the LV wall was removed. The sewing cuff was fixed on the LV using eight 2-0 polyester sutures with large teflon pledgets. Aneurysmal fibrous scar tissue proved to be consistent

enough to withstand strain of the sutures. After placement of the inflow cannula in the LV cavity and anastomosis of the outflow graft with the ascending aorta, the driveline was tunneled and connected to the external driver. The patient was weaned from cardiopulmonary bypass, and pump support was initiated.

Postoperative Course

Postoperative course was uneventful. Patient was successfully weaned from mechanical ventilation at postoperative day 1 and transferred to normal-care station at postoperative day 4. Trans-thoracic echocardiography revealed proper positioning of the inflow cannula. Because of previous left anterior descending artery revascularization with a drug-eluting stent, we initiated triple oral anticoagulation (warfarin with a target International Normalized Ratio between 2.5 and 3.0, aspirin 100 mg, and clopidogrel 75 mg daily). Patient was discharged from the hospital on postoperative day 33 and to date (184 days after surgery) has had no thromboembolic or hemorrhagic events. Serial echocardiograms done during follow-up showed stable alignment of the inflow cannula. Clinical state and quality of life improved markedly (New York Heart Association class I).

Conclusion

End-stage heart failure because of ischemic cardiomyopathy with an LV aneurysm after a myocardial infarction still poses a challenge to implanting an LV assist device. The focus of concerns have been regarding fixation of the inflow cannula in thin myocardial tissue and possible formation of thrombi afterward, resulting in pump thrombosis and cerebrovascular events.¹ Concomitant LV remodeling either by the means of endoventricular circular patch plasty (Dor procedure)² or by the means of partial LV reconstruction by placing pledgeted sutures around the aneurysmatic sac³ or performing a Fontan stitch around a Hegar dilator⁴ has been, therefore, promoted as an option to facilitate secure cannula fixation and exclude any thromboembolic events originating from debris located in the aneurysmal cavity. To our knowledge, this is the first case reporting favorable midterm outcome after conventional implantation of an LV assist device in a giant LV aneurysm.

Received December 17, 2016; accepted February 3, 2017.

From the Departments of Cardiac Surgery (S.S., A.W., O.D.) and Cardiology (F.F., K.A., G.S.), Medical University Graz, Austria.

Correspondence to Sotirios Spiliopoulos, MD, Department of Cardiac Surgery, Medical University of Graz, Auenbruggerplatz 29, 8036 Graz, Austria. E-mail sp11@outlook.de

(*Circ Heart Fail.* 2017;10:e003803. DOI: 10.1161/CIRCHEARTFAILURE.116.003803.)

© 2017 American Heart Association, Inc.

Circ Heart Fail is available at <http://circheartfailure.ahajournals.org>

DOI: 10.1161/CIRCHEARTFAILURE.116.003803

Aneurysmatic tissue proved to be consistent enough to facilitate secure fixation and prevent future misalignment of the inflow cannula. Suction events were not documented. Triple oral anticoagulation probably contributed to a thromboembolism-free survival without causing bleeding events.

Disclosures

None.

References

1. Chernyavskiy AM, Marchenko AV, Lomivorotov VV, Doronin D, Alsov SA, Nesmachnyy A. Left ventricular assist device implantation combined with surgical ventricular reconstruction. *Tex Heart Inst J*. 2012;39:627–629.
2. Garbade J, Bittner HB, Barten MJ, Rastan A, Lehmann S, Mohr FW, Borger MA. Combined surgical left ventricular reconstruction and left ventricular assist device implantation for destination therapy in end-stage heart failure. *Circ Heart Fail*. 2011;4:e14–e15. doi: 10.1161/CIRCHEARTFAILURE.111.961219.
3. Fatullayev J, Butters T, Sabashnikov A, Garcia Saez D, Mohite PN, Edwards G, Hoegerle B, Wahlers T, Popov AF, Simon AR. Left ventricular assist device implantation with concomitant left ventricular reconstruction without patchplasty. *J Artif Organs*. 2014;17:370–372. doi: 10.1007/s10047-014-0785-x.
4. Palmen M, Verwey HF, Haeck ML, Holman ER, Schalij MJ, Klautz RJ. Implantation of a left ventricular assist device in patients with a complex apical anatomy. *Ann Thorac Surg*. 2012;94:2122–2125. doi: 10.1016/j.athoracsur.2012.05.036.

KEY WORDS: aneurysm ■ cardiomyopathy ■ drug-eluting stent ■ heart failure ■ mechanical circulatory support

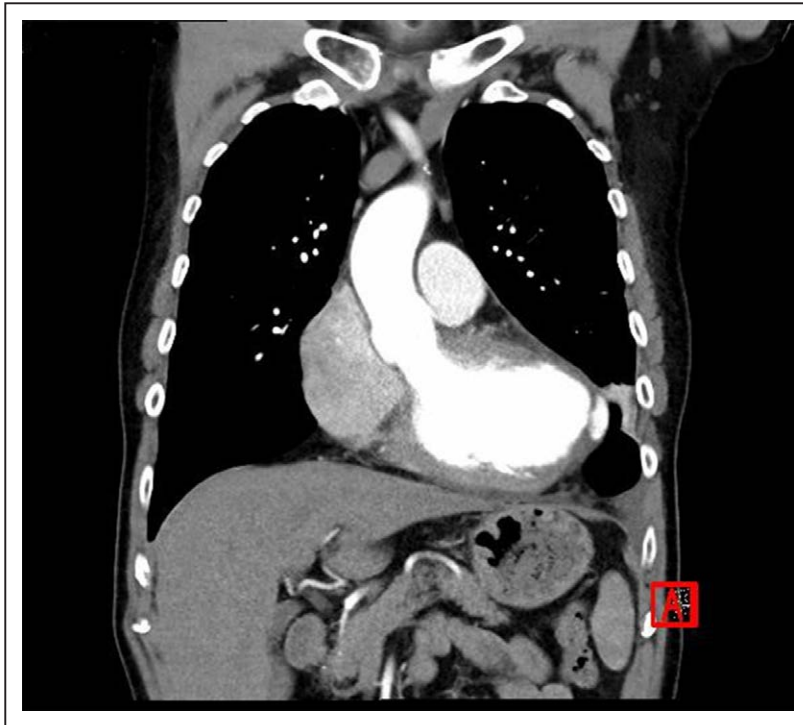


Figure. Giant left ventricular aneurysm with apical perforation (computed tomographic [CT] scan).

Implantation of the HeartMate III Left Ventricular Assist Device in a Giant Left Ventricular Aneurysm: Is Left Ventricular Reconstruction Mandatory?
Sotirios Spiliopoulos, Andrae Wasler, Friedrich Fruehwald, Klemens Ablasser, Gergana Stoschitzky and Otto Dapunt

Circ Heart Fail. 2017;10:e003803

doi: 10.1161/CIRCHEARTFAILURE.116.003803

Circulation: Heart Failure is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2017 American Heart Association, Inc. All rights reserved.

Print ISSN: 1941-3289. Online ISSN: 1941-3297

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://circheartfailure.ahajournals.org/content/10/3/e003803>

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Circulation: Heart Failure* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

Reprints: Information about reprints can be found online at:
<http://www.lww.com/reprints>

Subscriptions: Information about subscribing to *Circulation: Heart Failure* is online at:
<http://circheartfailure.ahajournals.org/subscriptions/>