A silicone breast implant (225 mL) was placed into the pericardial space to make room for later heart transplant. After closure of the chest, the patient was transferred to the ICU without any catecholamine support and with sufficient flow of both devices. The patient was successfully extubated on postoperative day 1 and remained in hemodynamically stable condition.

While ambulating on postoperative day 12, the patient had an acute hemodynamic decompensation. The patient was transferred to the operating room for emergency operation. We found displacement of the silicone implant, pushing the right-sided pump into the right atrium and thereby kinking the outflow graft of the right device. Repositioning of the implant and the pump led to immediate hemodynamic stabilization. The patient was again extubated after a few hours, and the remaining stay at the hospital was completely uneventful (hemodynamics are shown in Figure 2, A and B). Currently, the patient has successfully undergone cardiac transplant 14 weeks after implantation of both devices.

DISCUSSION

Our case substantiates the hypothesis that implantation of 2 HVAD centrifugal pumps may functionally serve as a total artificial heart. A silicone implant seems ideal to maintain intrapericardial space for subsequent heart transplantation; however, fixation within the pericardium is important. This option will continue to be important for patients with end-stage heart failure.

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Massive calcified left ventricular aneurysm and ventricular septum: Successful surgical repair and reconstruction

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Massive calcification of a ventricular aneurysm, particularly of the ventricular septum, is uncommon after myocardial infarction. Surgical repair and reconstruction of an extensive calcified left ventricular aneurysm and septum are unrecorded to our knowledge. This report describes the successful surgical repair of a massive calcified left ventricular aneurysm and ventricular septum 13 years after the initial myocardial infarction.

CLINICAL SUMMARY

A 63-year-old man presented with a 2-month history of indeterminate chest discomfort and increasing dyspnea. His medical history showed a notable extensive anterior infarction sustained 13 years previously. Electrocardiogram revealed significant abnormal Q-wave and ST-segment elevation in the anterior leads. A 2-dimensional echocardiogram showed a large apical aneurysm. The ventricular septum and apex became extensively calcified. There was a small cavity outside the apex that was filled with fluid, but it did not communicate with the cavity of the left ventricle. The left ventricle was significantly enlarged, but good left ventricular function was seen in the basal wall. Magnetic resonance imaging and cardiac catheterization confirmed these findings. Magnetic resonance imaging also showed a small thrombus on the aneurysmal inner wall. Coronary angiography showed that the left anterior descending and right coronary arteries were both occluded in their proximal portions.

The patient underwent operation, including resection of the left ventricular aneurysm and calcified septum, reconstruction of the ventricular septum, and a bypass to the right coronary artery.

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FIGURE 1. Massive calcified aneurysmal wall and ventricular septum (right).

The aneurysm was densely adherent to the pericardium. The small cavity outside the apex was filled with emulsion but not communicated with the left ventricle. The anterior wall, apex, and ventricular septum were massively calcified. The calcified aneurysm of the apex was resected (Figure 1), and small thrombi were removed from the aneurysm. The ventricular septum was immovable and bulged to the right ventricle. Most of the calcified muscular septum was resected (Figure 1), from the apex to the subaortic area, leaving an edge of approximately 1.5 cm of the posterior septum and approximately 1 cm around the membranous septum for suture. The ventricular septum was reconstructed using a large double Dacron patch approximately 9×6 cm. The double Dacron patch was placed on both sides of the preserved posterior and superior septum (around the membranous septum), and anchored with interrupted “U” sutures (Figure 2, A). The anterior edges of the patches were put together and anchored between the left and right ventricular walls, using interrupted “U” sutures and mattress sutures with Teflon strips (Figure 2, B). A bypass to the right coronary artery was performed using a vein graft. The first attempt to discontinue cardiopulmonary bypass failed, but the second attempt succeeded with intraaortic balloon pump support and more inotropic drugs. The transesophageal echocardiogram showed good function and shapes of both ventricles, with no significant regurgitation of the heart valves.

The patient was extubated on the first postoperative day, and the intraaortic balloon pump was stopped 49 hours after the operation, but inotropic support was required for 5 days. The patient was discharged 15 days postoperatively with no other complications. At 10 months after the operation, he is well, taking no cardiac medication or diuretics, and walking 1 km without rest.

DISCUSSION

Left ventricular aneurysms occur as a complication of acute transmural myocardial infarction, but massive

FIGURE 2. Reconstruction of the ventricular septum and both ventricles. A, Reconstruction of the ventricular septum using a double Dacron patch. B, Both the left and right ventricles were reconstructed with the classic technique (linear closure), using Teflon felt strips and mattress sutures.

calcified ventricular aneurysms are seen infrequently in clinics.¹⁻⁵ The presence of large amounts of calcium extending peripherally to the mouth of the aneurysm and in particular into the full depth of the ventricular septum did not permit application of the usual methods in left ventricular aneurysms, such as linear closure or patch closure techniques. The massive calcification was so hard that it was impossible to suture such a calcified wall or to anchor a patch inside the left ventricle. A small portion of the ventricular septum was preserved to suture and to avoid injuring the conductive system and aortic valve. The use of a double patch on both sides of the ventricular septum reinforced the fragile myocardium to secure closure of the ventricular septum. During the reconstruction of both ventricles, the mitral and tricuspid valves were carefully protected from injury or displacement.

The cavity outside the apex was proved to be a false aneurysm by pathologic examination. The pseudoaneurysm

may have been confined by the adherent pericardium, and the mouth of it may have closed spontaneously.⁴

CONCLUSIONS

This case demonstrated that it was feasible to reconstruct a ventricular septum using a double Dacron patch to replace the immovable calcification, and the short-term result was satisfied. More cases are needed to prove the safety and long-term results of the unusual method.

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Implantation of a centrifugal pump as a left ventricular assist device through a novel, minimized approach: Upper hemisternotomy combined with anterolateral thoracotomy

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The role and the use of ventricular assist devices (VADs) for the treatment of chronic heart failure are increasing tremendously worldwide. The VAD-related success is mainly based on 2 important factors: (1) novel technologies and (2) increased surgical experience leading to lower complication rates and better outcomes.

Mechanical cardiac circulatory support with the novel HeartWare ventricular assist device (HVAD; HeartWare International, Inc, Framingham, Mass) has become an established therapy for left ventricular (LV) failure.¹⁻³ Within the past years more than 150 cardiac assist devices were implanted at our institution, and the total number of VAD implantations continues to increase steadily. While complication rates decrease, survivals increase and the long-term outcomes have improved significantly over the years.

Herein we report the case of a male patient with chronic heart failure (New York Heart Association class III-IV) secondary to dilated cardiomyopathy in whom we successfully implanted a centrifugal blood pump (HeartWare) as an LV

assist device (LVAD). We used a novel implantation technique (upper hemisternotomy combined with anterolateral thoracotomy) to reduce complication rates (minimize trauma, reduce bleeding complications, and avoid right heart failure).

CLINICAL SUMMARY

A 41-year-old male patient was admitted with chronic heart failure resulting from dilative cardiomyopathy (New York Heart Association class III-IV). Echocardiography revealed an ejection fraction of 15%, cardiac index was measured at $1.5 \text{ L} \cdot \text{min}^{-1} \cdot \text{m}^{-2}$, central venous saturation decreased to 35%, and the patient reported having shortness of breath at rest. Therefore, catecholamine therapy was initiated with dobutamine. Additionally, levosimendan therapy was started in the intensive care unit. However, cardiac output still remained low ($<4 \text{ L/min}$), the patient became clinically unstable, and the only realistic option was the surgical implantation of an LVAD. Therefore, the patient underwent urgent VAD implantation using a novel, minimized surgical approach.

The first step, transfemoral venous cannulation, was performed through the right femoral vein by the Seldinger technique. Second, upper hemisternotomy was used to implant the arterial cannula into the ascending aorta for extracorporeal circulatory support. Then, left anterolateral thoracotomy was performed to implant the VAD inflow cannula in the LV apex. Last, an end-to-side anastomosis of the VAD outflow cannula to the ascending aorta was performed through the upper hemisternotomy.

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