Case report

Cardiac transplantation following ACORN CorCap device implantation

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Abstract

Passive ventricular restraint devices, such as the ACORN CorCap, have been introduced as a potential therapy for congestive heart failure (CHF). These mesh devices act as a mechanical support for the dilated heart. Due to incorporation of the device to the epicardium, concerns about the feasibility of reoperation following CorCap placement have been raised. This case illustrates that although technically challenging, reoperation for heart transplantation after CorCap implantation is feasible and safe.

1. Introduction

Recently, passive ventricular restraint devices have been introduced as a potential therapy for congestive heart failure (CHF). The ACORN CorCap cardiovascular device (Acorn Cardiovascular, Inc., St. Paul, MN, USA) is one such device that has been tested in clinical trials as an isolated therapy or in conjunction with mitral valve surgery. Recent studies have shown both the safety and the benefit of passive restraint devices in patients with CHF, including decreased left ventricular dimensions and possibly improvement in left and right ventricular function [1—3]. These data are the basis for on-going clinical trials in Europe and North America. Despite its more widespread and safe application in Europe, and positive results from the ACORN Clinical Trial in the United States, the U.S. Food and Drug Administration (F.D.A.) recently denied approval for the CorCap device. One concern that the advisory panel raised was the safety and feasibility of reoperation in patients who had undergone CorCap placement. This case illustrates reoperation for heart transplantation after CorCap implantation.

2. Patient profile

The patient was a 37-year-old male with longstanding idiopathic cardiomyopathy. Because of progressive CHF and significant mitral insufficiency, the patient was evaluated for mitral repair surgery and was enrolled in the ACORN CorCap trial. The patient underwent successful mitral valve repair with an undersizing annuloplasty ring as well as CorCap placement. The patient’s CHF initially improved as demonstrated by improvement in his New York Heart Association classification. Unfortunately, two years later, the patient’s CHF progressed and he was evaluated for cardiac transplantation. The patient was listed for cardiac transplantation, and a suitable donor organ became available.

3. Intraoperative course

The operation was conducted by first exposing the femoral vessels for possible access for cardiopulmonary bypass (CPB). A redo median sternotomy was performed uneventfully. The initial dissection revealed minimal adhesions around the aorta and the superior vena cava (SVC), as these areas were not covered by the CorCap device. Aortic and SVC cannulation was achieved and CPB was safely established. Minimal, easily dissected adhesions related to the prior atriotomy for the mitral valve repair were encountered. An additional inferior vena cava (IVC) cannula was placed for venous return (Fig. 1).

Notably, dense adhesions surrounding the CorCap cardio-vascular device were present along the lateral aspect of the left ventricle (Fig. 1). Examination of the native heart revealed that the dense adhesions caused by the device resulted in the fusion of the epicardium, the CorCap device and the pericardium. Thus, a plane between the device and the pericardium could not be established without possible phrenic nerve injury. Due to these concerns of phrenic nerve injury during device removal, an intramyocardial plane of...
dissection was developed, rather than proceeding with a standard cardiectomy. The myocardium was removed leaving a veneer of epicardium attached to the cardiovascular device (Fig. 2). The transplantation was conducted in the usual manner with the left atrial anastomosis being conducted first, followed by the IVC, pulmonary artery and aortic anastomoses, followed by reperfusion and the SVC anastomosis. The total ischemic time for the organ was 4.5 h. Due to the adhesions related to the CorCap device, the pre-implant dissection was prolonged (3 h). The donor organ functioned well and the patient was successfully weaned off of CPB.

Despite the use of aprotinin (as is standard with all cardiac transplantations at our institution), there was significant microvascular bleeding from the veneer of epicardium from the native heart. This shell of epicardium was attached to the CorCap device and the pericardium. Because of the microvascular bleeding, multiple transfusions were required. The Argon beam electrocautery was utilized successfully to coagulate the microvascular bleeding and achieve hemostasis. The postoperative course was unremarkable. Most importantly, the patient did not require take-back for bleeding and did not suffer any phrenic nerve dysfunction. The total postoperative length of stay was 14 days. There was one episode of rejection in the early postoperative period.

4. Discussion

This case illustrates that cardiac transplantation can be performed safely in patients who have undergone CorCap placement. The operative strategy includes availability of the femoral vessels for peripheral cannulation. The initial dissection was performed at the aorta and the SVC, which were relatively free of adhesions. Cardiopulmonary bypass could be safely established utilizing the aorta and the SVC. Due to the dense adhesions, separation of the device from the left lateral pericardium would result in damage to the phrenic nerve. Therefore, the epicardium was left on the device and the device was left attached to the lateral pericardium. Due to the unanticipated delay during pre-implant dissection, the donor organ total ischemic time was prolonged. This emphasizes the need to allow sufficient time to perform the recipient cardiectomy before the donor organ arrives. Notably, the adhesions that were encountered around the ventricles were more problematic than those seen following placement of a left ventricular assist device (LVAD). With the latter, dense adhesions exist around the LVAD outflow graft but the ventricles typically are not adherent to the pericardium. The Argon beam electrocautery was useful in controlling bleeding from the raw epicardial surface, and phrenic nerve injury was avoided. Despite the severe adhesions, this case illustrates that with slight modification of technique and added time for dissection, heart transplantation can be successfully performed in the setting of previous CorCap implantation.
References

