Case report - Assisted circulation

Biventricular assist device implantation as bridge to heart transplantation concomitant with open repair of infrarenal aortic aneurysm

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Abstract

Abdominal aortic aneurysm (AAA) is very frequently accompanied by coronary artery disease. Myocardial ischemia is the leading cause of mortality and morbidity in AAA repair. Therapeutic strategy, in presence of ischemic heart failure and AAA, is not well established. Actually, AAA is considered as a contraindication to ventricular assist device (VAD) support. We report a unique case of concomitant open AAA repair and biventricular VAD (biVAD) implantation in a patient with severe ischemic heart failure. This case argues that AAA should no longer be considered a contraindication for VAD implantation, provided the AAA repair is made before or simultaneously with device placement.

Keywords: Aneurysm; Circulatory assist devices; Heart failure; Transplantation, heart; Vascular disease

1. Introduction

Aortic aneurysms are considered a contraindication for implantation of a ventricular assist device (VAD) as a bridge to cardiac transplantation [1, 2]. We report a case of concomitant open abdominal aortic aneurysm (AAA) repair and biventricular VAD (biVAD) implantation as a bridge to transplantation in a patient with severe ischemic heart failure (HF).

2. Case report

A 56-year-old man was admitted for treatment of medically refractory severe ischemic HF, six months after experiencing an acute myocardial infarction. Coronary angiography after admission revealed occlusion of the circumflex and right coronary arteries associated with multiple and diffuse stenotic lesions in the left anterior descending coronary artery. The location and diffuse nature of the lesions ruled out revascularization. Ventriculography revealed a left ventricular ejection fraction of 20%, indicating severely impaired cardiac function. The refractory nature of the patient’s HF made him eligible for biVAD implantation as a bridge to transplantation.

Preoperative color Doppler ultrasonography revealed an infrarenal AAA whose maximum diameter was 62 mm with an extension to the right common iliac artery (maximal diameter at this level of 26 mm), a proximal neck length of 9 mm and tortuous iliac arteries. The AAA was repaired by means of open surgical placement of a bifurcated aortobiiliac graft. After standard closure of the abdominal wall, a paracorporeal biVAD (Thoratec Corporation, Pleasanton, CA) was implanted. The patient’s postoperative course was uneventful. Postoperative chest X-ray showed the left inflow cannula in the left ventricular apex (Fig. 1).

Four months after AAA repair, the patient underwent standard bicaval orthotopic heart transplantation. The patient’s posttransplantation course over three years of follow-up has been favorable.

3. Comment

In the present case, a patient with severely impaired cardiac function and an infrarenal AAA underwent successful concomitant open repair of the AAA before biVAD implantation as a bridge to cardiac transplantation. This case is notable because coronary artery disease is frequently associated with AAA and because AAA repair, especially in the face of impaired left ventricular function, is often complicated by myocardial ischemia [3].

In choosing a concomitant open approach to AAA repair, we opted for an approach that would give free access to the abdominal aorta and reduce the risk of bleeding. In doing so, we opted against endovascular aneurysm repair (EVAR), an established alternative to open AAA repair that has been credited with reducing perioperative mortality and morbidity [3, 4]. Paul et al. recently reported their successful use of EVAR prior to implantation of a left VAD as destination therapy for end-stage heart failure [2].
Despite EVAR’s good perioperative results, recent studies indicate that the postoperative course is often complicated by endoleaks and other graft-specific problems [3, 4]. Consequently, yearly follow-up by abdominal contrast-enhanced computed tomography is widely recommended for all patients undergoing EVAR. Declining renal function after heart transplantation is common [5]. Follow-up by abdominal contrast-enhanced computed tomography could be problematic for heart transplant candidates at risk for renal insufficiency.

Moreover, they could also be problematic and indeed rule out EVAR in cases (e.g. the present one) marked by the presence of tortuous iliac arteries and a too short proximal aneurysmal neck. Unsuitable anatomy for EVAR markedly increases the risk of adverse outcomes, need for conversion to open repair, or AAA rupture [4].

In this case, we opted to perform a concomitant procedure that would avoid two major mortality risk factors: acute decompensated HF after open AAA repair in a patient with severe ischemic HF and AAA rupture after biVAD implantation. Pasic et al. have described a case of combined thoracic aortic surgery and left VAD implantation in a heart-transplant candidate with chronic type B dissection [1].

4. Conclusion

This unique case of concomitant open AAA repair and biVAD implantation indicates that AAA should no longer be considered a contraindication for VAD implantation, provided the AAA repair is made before or simultaneously with device placement.

References