Cardiac transplantation for spontaneous coronary artery dissection†

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Abstract

We report a 49-year old female who presented with ST elevation myocardial infarction, in whom thrombolysis and coronary angioplasty failed to perfuse the myocardium. She was unsuitable for emergency coronary artery bypass grafting surgery due to the interval elapsed between the myocardial infarction, thrombolysis and large infarcted myocardium. Ventricular-assisted device support for a bridge to recovery or transplantation is a widely accepted treatment modality; however, in this case, it was unadvisable due to the extent of the infarcted myocardium and the risk of suturing outflow ports into the infarcted myocardium. The patient’s condition was stabilized with cardiac inotropic support, intra-aortic balloon counter pulsation and extracorporeal membrane oxygenation as a last resort until a heart became available for transplantation. The patient received successful orthotopic heart transplantation 4 days after her initial presentation and her postoperative recovery was uneventful.

Keywords: Coronary dissection • Ventricular-assisted device • Heart transplantation

CASE REPORT

A 49-year old female presented to the emergency department with persistent and severe chest pain. Electrocardiogram showed ST segment elevation in anterior leads leading to a diagnosis of anterior ST elevation myocardial infarction. As per protocol, the patient had thrombolysis, which failed to reperfuse the myocardium with persistent ST segment elevation. Transthoracic echocardiogram demonstrated a very poor left ventricular systolic function with an ejection fraction of 15% and wide anterior, septal and lateral wall akinesia.

She was transferred to the regional cardiac centre for rescue angioplasty. The angiogram revealed the dissection of the left main coronary artery extending to the left anterior descending artery of the circumflex (Fig. 1). Attempts at rescue angioplasty were unsuccessful (Fig. 2).

This patient presented with The Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) 1 (crash and burn) with cardiogenic shock and high level of inotrope and ventilatory requirements. She was stabilized with intra-aortic balloon counter pulsation and cardiac inotropic support and was transferred to our centre for mechanical circulatory support. Our protocol is to place the patients, particularly those with INTERMACS 1, on extracorporeal membrane oxygenation (ECMO) for 6-day interval as a bridge to decision and place them on the urgent list for orthotopic heart transplantation (OHT) within that period. Coronary artery bypass grafting (CABG) was considered high risk due to the duration of the myocardial infarct and risks from the recent thrombolysis and anticoagulation and antiplatelet agents used in the emergency setting. Moreover, a ventricular-assisted device system, whether Left Ventricular Assisted Device or BiVentricular Assisted Device, short-term or long-term, would have been a viable option should a donor heart become unavailable within the 6-day interval. The patient’s right heart catheter studies demonstrated a pulmonary artery pressure of 28/14 with mean of 18. She had cardiac output of 2.9 l/min. ECMO stabilized her condition and access was through the left common femoral artery and vein. She was placed on the urgent transplant list.

Her transplantation work-up revealed that she was group positive and cytomegalovirus negative. There were no concomitant illnesses, and she had a negative panel reactive antibody test. The creatinine clearance was 133 ml/min and her serum creatinine remained low on ECMO. Although her AST was elevated, this was attributed to the extent of myocardial infarction and raised Creatinine Kinase of 5760 µ/l. Her B-natriuretic peptide was 71 pmol/l. An OHT was performed on day 4 after her myocardial infarction and she had an uneventful recovery from this operation. She was discharged home on day 16 following her heart transplantation.

DISCUSSION

To date, approximately 150 cases of spontaneous coronary artery dissection (SCAD) have been reported in the literature after the first description in 1931 [1]. SCAD is an uncommon cause of acute coronary syndrome and sudden cardiac death. It
occurs in relatively young people and particularly in females. It can be a consequence of coronary angiography, cardiac surgery procedures, thoracic trauma or Marfan syndrome.

Patients with SCAD are traditionally divided into three groups: young women in the peripartum, patients with CAD and an idiopathic group. Its pathogenesis remains poorly understood, although several risk factors like hypertension, collagen disorders, intense physical effort and blunt chest trauma have been considered to be predisposing factors for the development of such a condition. The diagnosis of SCAD should be considered in all patients with symptoms of acute myocardial ischaemia, particularly if they are young females and free of risk factors for coronary artery disease [2].

Although SCAD is considered to be a serious condition with a high risk of death, there are no standardized management plans. In a recent retrospective study, of 23 patients who sustained SCAD, 43% were treated medically, while 57% underwent revascularization. After 15 months of follow-up, 77% of the discharged patients were event free. All the patients who were medically treated were asymptomatic at follow-up. Medical treatments are frequently considered in haemodynamically stable patients, while primary intracoronary stenting is usually provided in the case of single-vessel disease [3]. CABG is reserved for unstable patients with left main stem or two-vessel disease and/or severe left ventricular dysfunction. Yet, finding an unaffected portion of the vessel and bypassing into the true lumen can be challenging [4].

In a recent case report and review of the literature, Farzan et al. presented a good description of 2 atypical cases with their mode of management. However, the spectrum of our case report goes beyond the typical management plan that would normally be utilized in SCAD. The medical vs surgical options were evaluated and both deemed unsuitable to salvage the patient’s myocardium and life. The expertise required to decide on heart transplantation was necessary to move forward in managing this atypical presentation of SCAD. Our literature search revealed that ECMO as a bridge to transplantation after SCAD was previously described only once after failed CABG [4].

CONCLUSION

This led us to deduce that given the option in hand, the optimal management not only depends on vessels or presentations involved, but rather on the high level of suspicion, understanding the limitation of one’s expertise and the mobilization of a mechanism in patient management that will impact outcomes.

Conflict of interest: none declared.

REFERENCES