Case report

The use of off pump surgery for management of penetrating coronary artery injury

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Abstract

Penetrating trauma to the chest leading to coronary artery injury is associated with a high mortality rate, especially in the case of injury to the left anterior descending (LAD) coronary artery. The mortality rate remains high whether they are managed with primary ligation or with coronary artery bypass grafting using conventional cardiopulmonary bypass techniques. We report a case of proximal LAD coronary artery injury successfully treated with off pump coronary revascularisation. © 2002 Published by Elsevier Science B.V.

Keywords: Off pump coronary artery surgery; Coronary artery injury; Penetrating trauma

1. Introduction

Injury to the coronary artery following penetrating trauma to the chest has been managed by primary ligation or by coronary artery revascularisation using conventional cardiopulmonary bypass (CPB) techniques [1–5]. We report a case of successful management of left anterior descending (LAD) coronary injury using off pump coronary artery bypass graft (CABG).

2. Case report

A 33-year-old man was brought to Accident and Emergency Department with a stab wound over the anterior aspect of the left chest wall. After being alert for a brief period he collapsed and arrested. He was found to be in electromechanical dissociation that required resuscitation including intravenous fluid administration and blood transfusion. The resuscitation was successful but the patient remained haemodynamically unstable. A chest drain was inserted 300 ml of blood was drained.

On chest X-ray, the lungs appeared fully expanded on both sides but the cardiac silhouette was enlarged. A trans-thoracic echocardiogram (TOE) was performed which confirmed the diagnosis of cardiac tamponade with significant left ventricular impairment. A decision for emergency exploration was taken. Sternotomy was performed and the pericardium was opened. A large amount of fresh blood and clots were evacuated and immediate haemodynamic improvement achieved. An active bleeding site was noticed at the level of the proximal LAD coronary artery, which had been transected by the stab wound. Prolene stitches, reinforced with autologous pericardium were used to control the bleeding site. Ischaemic changes were noted on electroencephalography (ECG) and a TOE confirmed anterior wall motion abnormalities. A decision to perform off pump LAD revascularisation was taken and a segment of saphenous vein was anastomosed into the mid portion of the LAD, using a 2 mm intra-coronary shunt. After a few minutes of reperfusion, the ECG showed no persistent ischaemic changes and the TOE confirmed normal anterior wall motion. Following the operation, the patient made an uneventful recovery and was discharged home on the post-operative day 7.

3. Comment

Penetrating cardiac injuries are mostly caused by stab and gunshot wounds and are associated with a high mortality. Injury to the right ventricle is the most common followed by penetrating trauma to the left ventricle, right and left atrium, great vessels and coronary arteries [1,2].

Coronary artery injury is manifested commonly as peri-cardial tamponade, haemothorax, and electrocardiographic abnormalities [3], and is associated with high mortality. The more commonly injured coronary arteries are the LAD, the right and the circumflex coronary artery, respectively.
Coronary artery injury can be treated with either ligation or revascularisation. Distal coronary artery injury can be safely ligated [4] but primary ligation of the proximal LAD injury may result in extensive myocardial infarction, which may be fatal or lead to subsequent significant impairment of ventricular function or aneurysm formation. Alternatively, coronary artery revascularisation can be performed using either the saphenous vein or the internal mammary artery graft. In a review of 711 cardiac injuries, Wall et al. [1] found an overall 76% mortality in a subgroup of 21 patients treated with primary ligation. In this group, only two patients underwent coronary artery bypass grafting post-ligation with a mortality of 50%. However, the overall clinical outcome for patients undergoing emergency CABG using CPB was not significantly better than those treated with ligation alone [5].

CABG on the beating heart has been successfully performed for high-risk patients and has been shown to be less invasive than conventional CABG [6]. It has been reported to be safe with the use of modern stabilisation techniques in non-elective settings [7]. Locker et al. [8] have shown a lower peri-operative mortality after an emergency off pump CABG compared with on pump coronary revascularisation. Indeed in our case, a prompt and successful off pump revascularisation was achieved and the use of an intra-coronary shunt was helpful in reducing the ischaemic insult and preventing further left ventricular dysfunction [9]. The immediate post-operative recovery of the ECG ischaemic changes and wall motion abnormalities seen on the TOE demonstrated the effectiveness of the off pump LAD revascularisation in this emergency situation.

In conclusion, beating heart coronary revascularisation provides a safe alternative to primary ligation and/or conventional CABG for management of proximal LAD injuries.

References