Case report

Coronary artery bypass graft after esophagogastrectomy

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Abstract

A 71-year-old male with a history of retrosternal gastric bypass, after a resected esophageal carcinoma, developed angina pectoris due to stenosis of the left main trunk and the left anterior descending artery. The patient was treated with off-pump beating-heart coronary artery bypass approached via left thoracotomy. Two free conduits arising from the left internal mammary artery were utilized for this particular case, since the aortocoronary bypass was impossible due to the severely calcified aorta. Postoperative angiography confirmed good coronary flow and the patient has been symptom free for 6 months.

Keywords: Coronary artery disease; Malignant tumor; Esophageal disease

1. Introduction

Coronary artery bypass grafting (CABG) on a beating heart has recently become a common procedure [1–4]. Patients with a calcified aorta, chronic obstructive pulmonary disease, or a history of cerebrovascular accidents are considered to be high risk for coronary artery bypass grafting on cardiopulmonary bypass; however, they are not contraindications for off-pump beating heart CABG. Since beating-heart CABG does not require either an aortic cross-clamp or aortic cannulation, this procedure involves no risks of cerebral or peripheral embolization associated with aortic manipulations, and does not always require midline sternotomy. Small thoracotomy at the fourth intercostal space is widely used in beating-heart CABG, when the primary target for revascularization is the left anterior descending artery (LAD). Furthermore, left lateral thoracotomy has been utilized to expose the left circumflex artery (LCX) [5,6]. We present a case of off-pump coronary artery bypass on a beating heart performed via left anterolateral thoracotomy on a patient with unstable angina and a history of retrosternal gastric bypass due to esophageal cancer.

2. Case report

A 71-year-old male with unstable angina, associated with S-T segment depression on the anterior leads of electrocardiogram, underwent coronary angiography which demonstrated significant stenosis both on the left main coronary artery and on the middle segment of the LAD. Percutaneous transluminal coronary angioplasty (PTCA) was not indicated due to significant stenosis on the left main trunk and hypoplastic right coronary artery (RCA).

The patient’s past history was significant for esophagogastrectomy with retrosternal gastric bypass for esophageal cancer 3.5 years before admission. CT of the chest demonstrated gastric bypass just behind the sternum, and severe calcifications of the aorta (Fig. 1).

During surgery, the coronary artery was approached via left anterolateral thoracotomy. The LIMA was harvested from the undersurface of the sternum without difficulty. The inferior epigastric artery (IEA) was harvested and anastomosed onto the LIMA in an end-to-side fashion, so that a composite ‘Y’ graft was made. The bypass targets of the LIMA and the IEA were the LAD and the diagonal artery,
respectively. The harvested saphenous vein was initially intended to be used as an aorto–coronary bypass graft between the posterolateral branch of the LCX and the descending aorta or the ascending aorta. However, both the ascending aorta and the descending aorta demonstrated multiple calcified lesions, and it was impossible to place a side clamp on the aorta for an aorto–coronary bypass. The length of the saphenous vein graft was too short to make a subclavian–coronary artery bypass. Thus, the distal end of the saphenous vein was anastomosed with the middle of the IEA, which was already anastomosed with the LIMA.

During the operation, the heart rate was controlled with a beta-blocker (propranolol) and a transvenous temporary pacemaker. The regional mechanical immobilization platform (US Surgical®) and double looped silicone retractor tapes were placed on the coronary artery in order to obtain a stabilized operating field. Anastomosis of the saphenous vein to the posterolateral branch of the LCX, IEA to the diagonal artery, and LIMA to LAD was performed using continuous 8-0 Prolene sutures. The coronary clamp times for the LCX, diagonal artery, and LAD were 12, 9 and 10 min, respectively.

The postoperative course was uneventful. Postoperative angiography performed 2 weeks after surgery demonstrated patent grafts (Fig. 2). The patient was discharged from the hospital and remained event free during the 6-month follow up.

3. Discussion

A previously reported similar case of CABG after esophagogastrectomy, due to esophageal carcinoma, was approached via left thoracotomy and the patient underwent CABG with LIMA–LAD bypass under hypothermic cardiac arrest (15°C) using cardiopulmonary bypass [7]. Using minimally invasive surgery, patients with an isolated LAD lesion can currently be approached via small left thoracotomy and anastomosed on a beating heart condition. A larger left thoracotomy has been applied for a reoperative case or isolated LCX revascularization. Mobilization of the retrosternal esophageal substitute under midline sternotomy may be technically feasible but it would require a longer operating time. Off-pump beating-heart CABG via the mid-sternotomy approach could revascularize the RCA and LAD system, but not the LCX without hemodynamic changes from the median approach. Since the bypass targets were the LAD and LCX, the midsternotomy approach had no advantage in our patient, thus we chose the left thoracotomy approach. Left thoracotomy provided excellent exposure of the left coronary artery system, as well as the left internal mammary artery, and provided sufficient
space for placement of the mechanical immobilizer on the coronary artery.

The selection of grafts for this reported patient was limited. The right gastroepiploic artery could not be used, because it had been sacrificed during esophagogastrectomy. Due to a positive Allen’s test, the radial arteries were not harvested. The right internal mammary artery was not selected, due to the positioning of the patient and the expected adhesions around the internal mammary artery after esophagogastrectomy via right thoracotomy. The left pleural cavity had never been operated on; thus, the LIMA was harvested relatively easily. The IEA was the last choice of the arterial conduit for this particular patient. If the descending aorta lacked calcification and was in good condition, descending aorto-coronary artery bypass using the saphenous vein graft may have been indicated. However, our patient exhibited severe calcification of both the ascending and descending aorta; thus, it was impossible to perform aorto-coronary artery bypass without the risk of cerebrovascular accident or distal emboli. Therefore, the surgery was completed with relatively complicated composite grafts; two conduits depending on the flow from the left internal mammary artery, as shown in Fig. 2.

References