Case Report

Minimally invasive direct coronary artery bypass plus coronary stent for acute coronary syndrome: a case report

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Abstract  A 69-year-old female patient was admitted because of 3 days of worsened chest pain. Coronary angiography showed 60% stenosis of distal left main stem, chronic total occlusion of left anterior descending (LAD), 70% stenosis at the ostium of a small left circumflex, 70-90% stenosis at the paroxysmal and middle part of a dominant right coronary artery (RCA), and a normal left internal mammary artery (LIMA) with normal origination and orientation. Percutaneous intervention was attempted but failed on the occluded lesion of LAD. The patient received minimally invasive direct coronary artery bypass (MIDCAB) with left LIMA isolation by Davinci robot. Eleven days later, the RCA lesion was treated by Sirolimus Rapamicin eluting stents implantation percutaneously. Then the patient was discharged uneventfully after 3 days hospitalization. Our experience suggests that two stop shops of hybrid technique be feasible and safe in the treatment of elderly patient with multiple coronary diseases. (J Geriatr Cardiol 2008; 5:186-189)

Key words coronary artery disease; coronary artery bypass; percutaneous coronary intervention

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Case report

The patient was a female, 69 years old and with a history of exertional chest pain for 3 years. She was admitted because of 3 days of worsened chest pain. The pain was substernal and radiated to the left arm. It lasted for about 10 minutes and was complicated with nausea and perspiration. She was sent to the emergency department because the pain could not be relieved by rest and sublingual nitroglycerin. She had no histories of hypertension and diabetes. She was not smoking and drinking.

On examination, the temperature was 36.4 ºC, the pulse 70 bpm, the respiration 18 bpm, and the blood pressure 130/80mmHg. There was not cyanosis on lips. The lungs were clear. The heart rhythm was regular without murmur. Peripheral pulses were symmetric.

Electrocardiogram showed coronary T waves on lead I, avL, V₁-V₅, and inverted T waves on leads II, III and avF. The heart was not enlarged on echocardiography and left ventricular ejection fraction was 56%. Laboratory tests of blood routine and cardiac biomarkers were normal. Coronary angiography (Fig. 1A and 1C) showed 60% stenosis of distal left main stem, chronic total occlusion of left anterior descending (LAD), 70% stenosis at the ostium of a small left circumflex, 70-90% stenosis at the paroxysmal and middle part of a dominant right coronary artery (RCA), and a normal left internal mammary artery (LIMA) with normal origination and orientation. Percutaneous intervention was attempted but failed on the occluded lesion of LAD. Coordinated consultation by cardiologist and surgeon was conducted and decision of two stop shops of hybrid procedure was made for the patient. It was designed that LIMA isolation by Davinci robot and minimally invasive direct coronary artery bypass (MIDCAB) was carried out at first, and then sirolimus (Rapamicin) eluting stents were implanted in RCA percutaneously.

On August 1 of 2008, the patient received MIDCAB from LIMA to LAD. The procedure has been reported elsewhere.¹ In brief, invasive artery pressure, central vein pressure, pulmonary artery pressure and capillary wedge pressure were monitored after successful general anesthesia. Urine catheter was placed. DaVinci system consisted with robot arm and endoscopy was mounted. Distal LIMA was isolated by robot and then anastomosed into the LAD by MIDCAB. LIMA flow measured by ultrasound Doppler was 33 ml/min. Heparin was neutralized by protamine. On day 12 after operation, LIMA angiogram showed TIMI 3 blood flow (Fig. 1B).

On August 12 of 2008, RCA lesion was treated by Sirolimus eluting stents implantation percutaneously. After...
Figure 1  Coronary angiography before and after LAD MIDCAB and RCA sirolimus eluting stent implantation. A. Left coronary angiography showed 60% stenosis of distal left main stem, chronic total occlusion of LAD and 70% stenosis at the ostium of a small left circumflex. B. RCA was 70-90% stenosis at its paroxysmal and middle part. C. The anastomotic stoma between LIMA and LAD was patency well with TIMI 3. D. Two stents in RCA (4-28mm and 4-24mm) were completely dilated without residual stenosis and deformation. MIDCAB, minimal invasive direct coronary artery bypass; LAD, left anterior descending artery; RCA, right coronary artery; LIMA, left internal mammary artery

the establishment of right femoral artery approach, IIb/IIIa receptor inhibitor plus heparin was administered. A 6F JR4 guiding catheter was used to support a BMW guide wire and a Safecut predilation balloon penetrating the lesion. After predilation, RCA lesion was overlapped with two overlapped sirolimus eluting stents with biodegradable polymer from distal to paroxysmal (4-28mm and 4-24mm, Helios Co., China). Then a high pressure balloon (4-12mm, Grip Co.) was used for postdilation to eliminate residual stenosis (Fig. 1D). Finally, optical coherence tomography (OCT) test showed the stents dilated completely without deformation, malapposition or prolapse (Fig. 2). The patient was discharged 3 days after intervention without complications. During 2 week’s follow-up, she felt well and no major adverse cardiac events (MACE) were detected.

Discussion

Coronary artery bypass graft (CABG) remains treatment of choice for aged patients with multiple coronary diseases. CABG can be performed with on-pump and off-pump techniques according to the individual variation. On-pump technique is usually adapted to patients whose LAD, LCX and/or RCA need to be bypassed. The grafts could totally or partly be arteries. On-pump technique has the advantages of wider indications, more complete revascularization, and simultaneous treatment ability to complicated diseases or abnormalities, whereas its disadvantages include relatively more invasive nature, higher risk of complication, longer period of recovery and lower 5 year patency rate of vein graft. Off-pump technique is more suitable for simple LAD or great diagonal disease. LIMA is the most often used graft. The procedure could be conducted either by traditional minimal invasive approach or by modern percutaneous robot or endoscopic technique. It has the advantages of relatively less invasive, lower risk, quicker recovery and longer patency of artery grafts. But it also has the disadvantages of narrower indications, higher cost and difficulty in the treatment of complicated diseases or abnormalities.

In recent years, for the purpose of obtaining the largest benefit of complete revascularization and ideal long-term efficacy with the most minimal invasive and risk, Angelini GD et al. developed a hybrid technique consisted with MIDCAB and percutaneous coronary intervention (PCI) in 1999. Later, Friedrich and colleagues began to use endoscopic skill to replace mini-incision technique. Because of the limitation of logistic support in different centers and the requirement of patient situation, hybrid procedure could be divided into styles of one stop shop and two stop shops. The former is conducted at the same operative room armed with specialized surgical and interventional equipments.
Surgical and interventional procedures are completed at the same session by the same team, while the latter is carried out at different laboratories or operative rooms in different time.

This case was an elderly patient with multiple coronary diseases. Her left circumflex was too small for percutaneous coronary intervention. The lesion in RCA was suitable for stenting and the trial to penetrate the chronic total occlusion in LAD was failed. Therefore we decided to treat this patient with hybrid technique. Due to the limitation of logistic support, the patient was designed to receive two stops of hybrid procedure. In surgical operation room, her LIMA was isolated by robot at first and then connected into LAD. Ten days later, she was sent to the catheter laboratory and her RCA lesion was treated by two large sirolimus eluting stents. From this hybrid procedure, the patients obtained the benefits of LIMA graft to LAD with minimal invasive and big sirolimus stent to RCA percutaneously. It could provide the patient relatively longer patency of the target coronaries and decrease long-term MACE.10,11 The disadvantages of this approach are repeated procedures, prolonged hospitalization and higher total cost.

In conclusion, two stops shop of hybrid technique are feasible and safe in the treatment of elderly patient with multiple coronary diseases. But the long-term efficacy of this treatment modality needs to be confirmed in larger population of patients.

References


Figure 2  The long lesion of right coronary artery was treated by two rapamicin eluting stents and the stents were postdilated by a high pressure balloon (left panel). Optical coherence tomography study from distal to paroxysmal (right panel) showed the stents were well dilated and apposed without deformation and prolapsed debris.