Case report

Unexpected stent thrombus after minimally invasive direct coronary artery bypass in hybrid re-vascularisation

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Abstract

The progress in anti-platelet therapy and percutaneous coronary intervention led to reconfigure indications of hybrid re-vascularisation. However, there are still some controversies over indication, timing and patient management during the procedure. The case discussed here is a patient who was diagnosed with myocardial infarction and treated with hybrid re-vascularisation. The patient underwent stent insertion followed by bypass surgery. After the hybrid procedure, the patient was stable but eventually died on the 12th day after the surgery owing to unexpected stent thrombosis. We discuss the current controversy over hybrid re-vascularisation, variables that can affect the outcome and the requirement for establishing accurate logistics based on our case.

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1. Introduction

Owing to the recent progress in anti-thrombotic therapy and percutaneous coronary intervention (PCI), hybrid re-vascularisation is anticipated to be practised more extensively for high-risk patients. For the successful practice of hybrid re-vascularisation, it is essential to establish accurate logistics based on the exact understanding of each patient’s characteristics and under systematic co-operation between the surgical and intervention teams. In this report, the acceptable indications for the procedure, optimal timing and the conditions required for successful establishment of logistics are discussed based on patients treated at our hospital by hybrid re-vascularisation.

2. Case report

A 56-year-old male presented to the emergency room with exertional dyspnoea and chest pain which had become worse over the last 2 months. According to coronary angiography (CAG), there was critical stenosis from the left main (LM) artery to the distal portion of the left circumflex (LCx) artery, and total obstruction of the proximal left anterior descending (LAD) (Fig. 1). During the PCI, LCx re-vascularisation was successfully performed using a bare metal stent, but LAD os was not successful owing to chronic total obstruction (CTO). The patient was relieved of chest pain and prepared for minimally invasive direct coronary artery bypass (MIDCAB). Aspirin and clopidogrel were stopped for 3 days, while the patient was given low-molecular-weight heparin (LMWH) before MIDCAB. MIDCAB was performed by left parasternal incision, without cardiopulmonary bypass. The left internal thoracic artery (LITA) was anastomosed to the distal LAD (dLAD). Two hours after the surgery, there was a sudden change in the electrocardiogram, indicating postoperative myocardial infarction. Hypotension showed no response to volume loading, with the cardiac index (CI) decreasing to 1.5 l min⁻¹. Ventricular tachycardia and ventricular fibrillation occurred and the patient was resuscitated followed by the application of an extracorporeal membrane oxygenation (ECMO) (T-PLSTM™, Twin Pulse Life Support, BHK Inc., Seoul, Korea) device. Follow-up CAG revealed no definite stenosis or obstruction at the anastomosis site, and the flow was well maintained. However, an acute in-stent thrombus was found at the LCx (Fig. 2); therefore, thrombectomy was performed. The patient’s vital signs stabilised and the ECMO was replaced by an intra-aortic balloon pump (IABP), followed by successful weaning. Despite all efforts, however, the patient’s pulmonary function deteriorated owing to acute respiratory distress
syndrome (ARDS) complicated by pneumonia, and he eventually died on the 12th day after the surgery.

3. Discussion

In spite of recent progress in percutaneous re-vascularisation techniques, coronary artery bypass grafting (CABG) is still considered as the gold standard for the complete re-vascularisation of multivessel coronary artery disease [1]. For a proximal LAD lesion, the use of LITA has been widely reported to have superior survival benefit compared to PCI. For other lesions, PCI has been reported to be less invasive than CABG, yet has not been shown to be advantageous in decreasing patient mortality [2,3].

When hybrid re-vascularisation was first introduced, it seemed to be a less-attractive option compared to off-pump CABG. This was caused by PCI’s higher target-vessel failure rate and the difficulty of establishing standardised protocol [4]. Continued progress in anti-thrombotic therapy and PCI technique has enabled hybrid re-vascularisation to play a greater role in high-risk patients. There has been a dispute among researchers regarding the optimal order of, and the interval between, surgery and PCI in hybrid procedures [1,5]. Friedrich and colleagues proposed the timing of the procedures according to three strategies: (a) surgery before percutaneous transluminal coronary angioplasty (PTCA)/stent, (b) PTCA/stent before surgery and (c) PTCA/stent combined with surgery [6]. The main advantage of undergoing surgery before PCI is very low PTCA/stent-failure rate. However, when an emergency operation is not available, then PCI before surgery can take a priority despite the fact that it can delay surgery. In addition, PCI combined with surgery is attractive but the intra- and perioperative settings of facilities are the main problem. Many variables such as individual characteristics, anatomic site and severity as well as the extent of the hospital’s facilities and proficiency of the medical practitioners can affect the decision-making process.

In cases where PCI is performed prior to surgery, there have been reports with conflicting results about the increase in haemorrhagic risk. Sthal and colleagues report that the risk of bleeding increases, while Davidavicius and colleagues report that anti-thrombotic therapy had no significant effect on postoperative blood drainage and perioperative treatment [1,7].

A dose of aspirin and clopidogrel for at least 1 year is the accepted standard therapy for the prevention of ischaemic events in patients who have experienced acute coronary syndrome [8]. However, many recent reports about resistance to aspirin and clopidogrel make it more difficult to establish a standardised protocol. Eikelboom and Hankey reported that despite dual anti-platelet therapy, acute or sub-acute coronary stent thrombus occurs in up to 2% of patients and aspirin resistance is considered to be present in up to 75% of patients under anti-platelet therapy [9]. Thus, a case-by-case approach is essential for optimal results.

In our case, the stent was first inserted into the patient’s LM distal to proximal LCx lesion, followed by surgical LAD lesion bypass after an interval of 6 days. The timing of the surgery may be difficult to determine because the anticoagulation therapy that inevitably follows PCI may cause perioperative bleeding complications. To prevent such problems, our patient received aspirin (100 mg day$^{-1}$) and clopidogrel (75 mg day$^{-1}$) for 3 days after PCI, followed by LMWH (fraxiparine 2850IU 2 doses day$^{-1}$). However, despite successful initial PCI and surgery, we eventually failed in hybrid re-vascularisation which induced hospital death. This unsatisfactory result might be caused by surgical manipulation and haemodynamic changes during MIDCAB in addition to inappropriate anticoagulant therapy.

Fig. 1. Patient’s initial coronary angiogram. The critical stenosis from the left main (LM) artery to distal portion of the left circumflex (LCx) artery and total obstruction of the proximal left anterior descending (LAD) were noted.

Fig. 2. Acute in-stent thrombus at the area of left circumflex (LCx) artery after minimally invasive direct coronary artery bypass (MIDCAB).
Therefore, we recommend that more aggressive anticoagulation therapy is required in case of PCI before surgery, especially when the bare stent used, for preventing the disastrous result such as in our case.

References


