MANAGEMENT OF EARLY GRAFT FAILURE FOLLOWING CORONARY ARTERY BYPASS GRAFTING SURGERY: A CASE REPORT

Heston Napitupulu [1)], Lisca Namretta [2)], Sheilla Giusti [2)], Maizul Anwar [1)]

ABSTRACT

Background: *Early postoperative graft failure after coronary artery bypass grafting (CABG) is still a significant problem that results in high morbidity and mortality. It is associated with early graft thrombosis, anastomotic stenosis, bypass kinks, overstretching or tension, significant spasm, and incomplete revascularization.* ***Case Report:*** *67 years-old male with Coronary Artery Disease involving three vessels (CAD 3VD) underwent CABG surgery. Direct post-operation electrocardiograph (ECG) showed changes in ST segments (elevation on anterior leads and depression on inferior leads) with a significant increase of cardiac markers level. Postoperative coronary angiography revealed an occluded left internal mammary artery (LIMA) graft and native left anterior descending artery (LAD) blockage. The patients' hemodynamics was not stable, and was urgently underwent an off-pump redo CABG. Intraoperatively we found thrombus at LIMA and saphenous vein graft (SVG) – right coronary artery (RCA) grafts caused by atheroma and dissection on the anastomotic site.* ***Discussion:*** *The diagnosis of myocardial infarction (MI) remains a clinical challenge since patients are unable to express classic clinical symptoms. Routine ECG combined with cardiac biomarker is beneficial in diagnosing MI post CABG, and percutaneous coronary angiography (PTCA) is useful in detecting the the grafts' patency. Although percutaneous coronary intervention (PCI) is preferable in the case of anastomosis problem with stable hemodynamic, redo CABG shows more benefit in salvaging infarcted myocardium in patients with unstable hemodynamic.* ***Conclusion:*** *Redo CABG surgery with new or additional grafting may save the myocardium and preserve its function in perioperative infarct caused by graft failure.*

Keyword*: Coronary Artery Bypass Grafting, Early Graft Failure, Surgery Complications.*

ABSTRAK

Latar belakang: Kegagalan *graft* paska-operatif dini pascabedah pintas arteri koroner (BPAK) merupakan masalah signifikan penyebab tingginya morbiditas dan mortalitas. Hal ini berhubungan dengan kejadian dini thrombosis *graft*, stenosis anastomosis, *graft* yang tertekuk, peregangan atau ketegangan, spasme yang signifikan, dan revaskularisasi yang tidak komplit.

Presentasi kasus: Pria usia 67 tahun dengan penyakit jantung koroner (PJK) yang melibatkan tiga pembuluh darah (3*vessel disease*/3VD) menjalani tindakan BPAK. Hasil elektrokardiogram (EKG) menunjukkan perubahan signifikan pada segmen ST (elevasi pada sadapan anterior dan depresi pada sadapan inferior) dengan adanya peningkatan *cardiac marker* yang signifikan. Pemeriksaan angiografi koroner pascaoperasi didapatkan oklusi pada *graft left internal mammary artery* (LIMA) dan blokade *left anterior descending artery* (LAD). Bedah pintas arteri koroner *redo off pump* segera dilakukan karena hemodinamik pasien tidak stabil. Intraoperatif didapatkan trombus pada LIMA dan *saphenous vein graft* (SVG) – *graft* di *right coronary artery* (RCA) yang disebabkan oleh ateroma dan diseksi pada anastomosis. **Diskusi:** Diagnosis iskemia/infark miokardium (IM) masih merupakan tantangan karena pasien tidak menunjukkan gejala klinis. Pemeriksaan elektrokardiografi (EKG) rutin yang dikombinasikan dengan *cardiac biomarkers* sangat berguna untuk diagnosis IM paska BPAK, dan *percutaneous coronary angiography* (PTCA) sangat berguna untuk mendeteksi patensi *graft*. Intervensi Koroner Perkutan (IKP) dapat dilakukan pada masalah anastomosis dengan hemodinamik yang stabil, sedangkan BPAK *redo* memberikan keuntungan lebih dalam menyelamatkan miokardium yang infark pada pasien dengan hemodinamik yang tidak stabil. **Kesimpulan:** Bedah pintas arteri koroner *redo* dengan penambahan *graft* yang baru dapat menyelamatkan dan mempertahankan fungsi miokardium pada perioperatif infark yang disebabkan oleh kegagalan *graft.*

Kata Kunci: Bedah Pintas Arteri Koroner, Kegagalan *Graft* Dini, Komplikasi Bedah.

1) Department of Cardiothoracic and Vascular Surgery at Siloam Heart Institute. #Corresponding author : Heston Napitupulu. Phone: +628119117070 E-mail: Heston_napit@yahoo.com. 2) General Practitioner at Siloam Heart Institute. Siloam Heart Institute Perjuangan road No.Kav.8, Kb. Jeruk, West Jakarta, Indonesia 11530

INTRODUCTION

Early postoperative graft failure after coronary artery bypass grafting (CABG) surgery is one of the most significant problems that caused high morbidity and mortality. The success of this procedure depends on constructing good quality anastomoses with durable conduits onto the appropriate coronary arteries.[1] The incidence of early graft dysfunction is ~3%.[2] Several studies revealed that in the early postoperative period of CABG, up to 8% of left internal thoracic artery grafts and 15% of saphenous vein grafts are occluded.[1,3] Up to 68% of in-hospital mortality are due to early postoperative graft failure, and this event also may lead to perioperative myocardial infarction (MI),

with an incidence between 5-10%.[1,2,4] Early graft failure is associated with early graft thrombosis, stenosis in anastomoses side, bypass kinks, overstretching or tension of the graft, significant spasm, and incomplete revascularization.[2] Redo operation with new/additional grafting may save myocardium cells in a patient with postoperative infarct caused by graft failure.[4]

CASE DESCRIPTION

A 67 years-old male was diagnosed with coronary artery disease involving three vessels (CAD 3VD) and underwent a CABG surgery with triple grafts. Coronary angiography before surgery showed 95-99% stenosis at middle right coronary artery (RCA), 80-90% stenosis at right posterior descending artery (RPDA), 50-60% stenosis at distal left main artery (LM), 50-90% stenosis at middle left anterior descending artery (LAD), and 80-90% stenosis at proximal left circumflex artery (LCx). Three grafts were performed: saphenous vein graft (SVG) – RCA, SVG – obtuse marginal artery (OM), and left internal mammary artery (LIMA) – LAD. The surgery went smoothly, and the patient return to the intensive cardiovascular care unit (ICCU) with a stable condition. Direct postoperative electrocardiography (ECG) shown significant ST-T changes; ST-segment elevation on anterior leads and ST-segment depression on inferior leads. Troponin T level was more than 2000ng/L. The patient was in a stable condition and extubated one-day postoperatively. On the second postoperative day, the patient was desaturated, and his hemodynamics was unstable. The patient was urgently reintubated. Then it was decided to do an urgent coronary angiography.

The result showed an occluded middle LIMA graft and native LAD blockage. After coronary angiography, the patient's hemodynamics still not stable, systolic blood pressure was 80mmHg, and experiencing three periods of arrhythmias (ventricular tachycardia). We put in intra aortic ballon pump (IABP) via the right femoral artery, and the patient was urgently moved to the operating theater for an off-pump redo CABG. Inoperative findings, we saw a thrombus at LIMA graft and SVG – RCA graft, then decided to take down the distal LIMA anastomosis and perform endarterectomy at LAD and put in a new SVG graft. The SVG – RCA graft's thrombus was removed, then we take down the anastomosis, perform endarterectomy at RCA, and re-anastomosis with the same SVG graft again. The unused LIMA graft was sutured to the myocardium with the Vineberg implant procedure, and the chest wall was closed with the usual procedure. The patient returns to ICCU with stable hemodynamics and extubate two days after

the redo surgery. The patient was discharged seven days after and had no complaints up to 2 months follow up. Echocardiography 1.5 months after the redo surgery shows left ventricular ejection fraction 45-50%.

DISCUSSION

Perioperative MI in the CABG procedure was associated with an increased rate of morbidity and mortality. In this case, the diagnosis of MI, remains a clinical challenge since patients are unable to express classic clinical symptoms.[2] Early diagnosis and reintervention have to be made rapidly to ventricular reserve function and improve the patients' outcome after CABG surgery.[1]

Routine ECG combined with cardiac biomarker is very useful in diagnosing MI post CABG. The universal definition of MI recommended cardiac troponins as MI marker in the early postoperative period after CABG surgery and was superior in sensitivity and specificity compared to creatinine kinase myocardial band (CKMB). Surgical trauma and the usage of a cardiopulmonary bypass (CPB) machine could cause ECG changes and elevated biochemical markers, which make those non-invasive markers have less diagnostic value to diagnose MI in post CABG patients. Transthoracic and transesophageal echocardiography were also not stated as the recommended tool due to its lack of detailed information about coronary arteries.

There were limited studies on detecting and managing patients with signs of early MI following CABG surgery.[4] Since MI remains the most common result of early graft failure following CABG, percutaneous coronary angiography (PTCA) was useful in detecting the grafts' patency. Although percutaneous coronary intervention (PCI) is preferable in the case of anastomosis problem with stable hemodynamic, but redo CABG shows more benefit in salvaging infarcted myocardium in patients with unstable hemodynamic. Redo surgery also more beneficial in detecting other associated problems with the anastomotic site.

CONCLUSION

Redo CABG surgery with new or additional grafting may save the myocardium and preserve its function in postoperative MI caused by graft failure.

REFERENCES

1. Tamer Turk. Early graft failure after coronary artery bypass grafting: diagnosis and treatment. *The European Research Journal*. 2016;2(2):85-92.
2. Maxime Laflamme, Nathelie DeMey, et al. Management of early postoperative coronary artery

bypass graft failure. *Interactive Cardiovascular and Thoracic Surgery*. 2012;14:452-456.

3. Ralf E. Harskamp, Judson B. Williams, et al. Saphenous vein graft failure and clinical outcomes: Toward a surrogate endpoint in patients following coronary artery bypass surgery?. *Am Heart J*. 2013 May;165(5):639-643.
4. Christian Rasmussen, Jens Juel Thiis, et al. Significance and management of early graft failure after coronary artery bypass grafting feasibility and result of acute angiography and re-re-vascularization. *European Journal of Cardio-thoracic Surgery*. 1997;12:847852.
5. Tom KW Wang, Ralph AH Stewart, et al. Diagnosis of MI after CABG with high-sensitivity troponin T and new ECG or echocardiogram changes: relationship with mortality and validation of the Universal Definition of MI. *European Heart Journal: Acute Cardiovascular Care*. 2013;2(4):323-333.