Mandala of Health
Vol.17, No.2, September 2024, Hal. 290-300
ISSN: 2615-6954
DOI: 10.20884/1.mandala.2024.17.2.12982

ANESTHESIA MANAGEMENT FOR PATIENTS WITH LOW EJECTION FRACTION UNDERGOING CORONARY ARTERY BYPASS GRAFTING (CABG)

PENANGANAN ANESTESI PADA PASIEN DENGAN LOW EJECTION FRACTION UNDERGOING CORONARY ARTERY BYPASS GRAFTING (CABG)

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ABSTRACT

Background: Coronary Artery Disease (CAD) is a condition caused by the formation of blockages in the coronary blood vessels. The primary non-invasive procedure for CAD patients is Percutaneous Coronary Intervention (PCI). However, complications during PCI, such as unstable hemodynamic arrhythmias, can occur, possibly due to Abrupt Vessel Closure (AVC). This remains a major issue for PCI failure and necessitating Coronary Artery Bypass Grafting (CABG). Case : We report a 68-year-old male patient with CAD and total occlusion of the Right Coronary Artery (RCA) and total occlusion of the Left Circumflex (LCx) who was unable to undergo PCI at a previous hospital. Subsequently, re-catheterization at RSUP Dr. Sardjito, CAD3VD was diagnosed, leading to a planned CABG surgery. The patient's clinical condition was relatively stable, though he had a low ejection fraction (41%). Induction, invasive monitoring placement, and intubation proceeded smoothly. CABG was performed with three grafts (LIMA-LAD, SVG-OM, SVG-PDA), and successful weaning was achieved with dobutamine support. The patient was in the ICU for 2 days for clinical and hemodynamic optimization before being transferred to the ICCU for further intensive care. Discussion: The main principle of anesthetic management in this case is to maintain a balance between myocardial oxygen supply and demand. Strict monitoring of hemodynamic changes during surgery is essential to guide necessary supportive therapy. Patients with low ejection fractions are at high risk for post-operative mortality and complications. Post-operative management in the ICU focuses on optimizing clinical condition and addressing any emerging potential issues.
Conclusion: Surgery for patients with CABG requires complicated and complex anesthetic techniques. This operation requires collaboration and good communication between the surgeon and the anesthesiologist.

Keywords: *Coronary Artery Disease, Coronary Artery Bypass Grafting, Low Ejection Fraction, Anesthesia Management.*

ABSTRAK

Latar Belakang: Pasien HF dengan *Coronary Artery Disease vessel desease* (CAD3VD) dengan *low Ejection Fraction* (low EF) memiliki risiko lebih tinggi terhadap komplikasi mortalitas pasca operasi. Salah satu tantangan bagi ahli anestesi adalah pengelolaan anestesi pada pasien ini, *advance cardiac monitoring* intraoperasi dan pascaoperasi adalah kunci keberhasilan pada kasus ini. Kasus: Kami laporkan pasien laki-laki 68 tahun dengan diagnosis *(CAD3VD)*. Pasien dengan HF low EF (EF 41%), kandidat untuk elektif *Coronary Artery Bypass Grafting (CABG)*. *Advance cardiac monitoring* dengan *arteri line*, *central venous cateter (CVC)*, *Pulmonary Artery Cateter* (*PAC)*, dan *Transesophagela Echocardiography* (TEE) digunakan sebagai parameter untuk menilai fungsi jantung selama pembedahan maupun pasca operasi di *Intensive Care Unite* (ICU). Pembahasan: Prinsip utama manajemen anestesi pada operasi revaskularisasi adalah menjaga keseimbangan antara suplai dan kebutuhan oksigen miokardium. Pemantauan ketat terhadap perubahan hemodinamik selama pembedahan sangat penting terutama pada kasus low EF untuk menentukan terapi suportif yang diperlukan, dengan pemasangan *artery line*, *CVC*, dan PAC untuk menilai *cardiac output* (CO), *cardiac index* (CI) serta evaluasi fungsi jantung dengan TEE. Mempertahankan hemodinamik, menghindari aritmia dan hipotensi dengan monitoring ketat dapat membantu untuk mencapai *balance anesthesia* pada kasus ini. Perubahan hemodinamik selama dan setelah pembedahan dipertahankan, dengan pemberian inotropik dan manajemen cairan yang tepat. Kesimpulan: Menjaga keseimbangan *suplay* dan *demand* miokardium dan penggunaan *adavance cardiac monitoring* seperti *artery line*, CVC, PAC dan TEE serta manajemen terapi cairan yang baik dapat membantu dalam manajemen anestesi pada pasien yang menjalani operasi revaskularisasi dengan low EF, dan menurunkan komplikasi pasca operasi dan durasi perawatan di ICU.

Kata kunci : *Advance Cardiac Monitoring, Anesthesia Management ,Coronary Artery With 3 vessel Disease, Coronary Artery Bypass Grafting, Low Ejection Fraction.*

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INTRODUCTION

According to the Global Burden of Disease and the Institute for Health Metrics and Evaluation (IHME) from 2014-2019, cardiovascular disease remains the leading cause of death in Indonesia. Data from the Basic Health Research (Riskesdas) in 2013 and 2018 show a trend in the increase of cardiovascular disease from 0.5% in 2013 to 1.5% in 2018.

According to BPJS Health data in 2021, cardiovascular disease has become the largest cost burden, with expenses reaching IDR 7.7 trillion (Hussain et al., 2016). Despite declining rates in the last several decades, coronary heart disease remains the leading cause of death in the United States, with the prevalence of 16.5 million for an angina pectoris or myocardial infarction diagnosis in 2017 (Benjamin et al., 2017).

Unlike valvular heart disease, coronary artery disease presents with symptoms that are more variable and progresswith more sudden, discrete events such as angina or myocardial infarction. Angina pectoris precedes only 18% ofmyocardial infarctions (Benjamin et al., 2017). Coronary artery disease (CAD) leads to angina pectoris, myocardial infarction, and ischemic heart failure. CAD is characterized by the development of atherosclerotic plaques within the coronary arteries, leading to stenosis and even the risk of blood vessel rupture. Chronic ischemia resulting from coronary artery stenosis can eventually cause heart failure or death (Doenst et al., 2019).

Management of CAD aims to reduce angina symptoms and prevent acute myocardial infarction or early death. In addition to medical therapy intended to control angina and prevent plaque progression, there are two other invasive strategies designed to restore adequate blood supply to ischemic myocardium due to coronary stenosis: percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG). Many studies have been conducted to compare the effectiveness of these two types of interventions for treatment goals. PCI in stable CAD, regardless of the type of stent used, has so far not been able to significantly improve survival or reduce the incidence of new myocardial infarction. On the other hand, CABG in stable CAD has been shown to improve survival and reduce the incidence of new myocardial infarction, although this depends on the severity of CAD and the presence of comorbidities such as diabetes (Benjamin et al., 2017).

The mortality rate for CABG patients with normal ejection fraction is around 1%, which increases to 7% in patients with low ejection fraction. Patient selection, improvement in surgical techniques, and optimal preoperative management play a crucial role in reducing post-CABG mortality. Various cardiac assist devices such as the Intra-aortic Balloon Pump (IABP), Left Ventricular Assist Device (LVAD), or Impella are also used to improve survival rates (Benjamin et al., 2017).

In patients undergoing CABG, where optimization of condition or availability of cardiac assist devices has not been maximized, this adds to the risk of morbidity and mortality. Anesthesia management for such patients requires stringent monitoring to maintain hemodynamic stability (Awan et al., 2020).

CASE REPORT

We report a 68-year-old male patient diagnosed with Coronary Artery Disease (CAD), with total occlusion of the right coronary artery (RCA), total occlusion of the left circumflex artery (LCx), 60% occlusion in the proximal LAD, and 90% occlusion in the mid LAD. The patient also has Congestive Heart Failure (CHF) and a low ejection fraction (low EF), and is planned to undergo Coronary Artery Bypass Grafting (CABG). The patient first experienced Acute Coronary Syndrome (ACS) about 1 year ago and was diagnosed with 3-vessel disease.

The patient first atact Acute Coronary Syndrome (ACS) approximately 1 year ago. He has a history of recurrent chest pain that resolves with oral nitrate administration. The patient is still able to work normally, climb and descend stairs up to 3 floors, and walk for exercise with rest. He reports shortness of breath or palpitations with heavy activity but has no swelling in the extremities and can sleep on his back with 1 pillow. The patient mentions a history of diabetes but does not take medication regularly. The oral medications he takes include Aspilet 40 mg once daily, Atorvastatin 20 mg once daily, Bisoprolol 5 mg once daily, and Spironolactone 12.5 mg once daily.

The patient underwent PCI at a hospital in Yogyakarta, but complications such as arrhythmia and instability arose during the procedure, leading to the termination of PCI. He was subsequently referred to RSUP Dr. Sardjito for re-catheterization, which confirmed CAD3VD and planned CABG. The patient has a weight of 67 kg, a height of 167 cm, a Body Mass Index (BMI) of 24.0 kg/m², and a Body Surface Area (BSA) of 1.76 m². Physical examination of the heart revealed a displaced apex to the lateral side, an enlarged right cardiac border, normal heart sounds I-II, and no murmurs or gallop rhythm. Other physical examinations were within normal limits. Routine blood tests showed no abnormalities, and arterial blood gas (ABG) analysis was normal.

On chest X-ray examination, cardiomegaly was noted with a Cardio-Thoracic Ratio (CTR) of 53%, while the pulmonary findings were within normal limits (***Figure 1***). The electrocardiography (ECG) findings showed T-wave inversion in leads I and aVL, ST elevation in leads V1-V4, and T-wave inversion in leads V5-V6 (Figure 2).

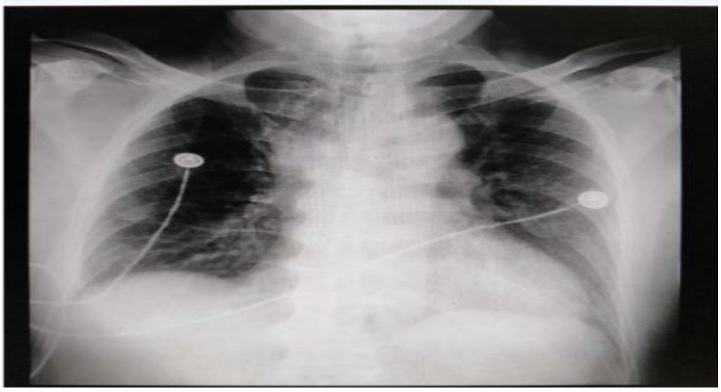

Figure 1. Chest X-ray

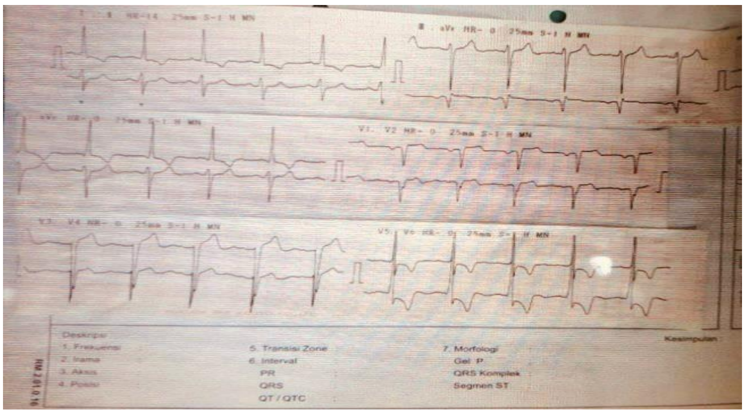

Figure 2. ECG

The Transthoracic Echocardiography (TTE) results showed left atrial (LA) and left ventricular (LV) dilation, reduced global systolic function with an ejection fraction (EF) of 41%, segmental kinetic disturbances, diastolic dysfunction of the LV, normal right ventricular (RV) systolic function, moderate mitral regurgitation (MR), restricted movement of the posterior mitral leaflet, and mild tricuspid regurgitation (TR).

The Angiography results showed that the left main (LM) artery was normal. The proximal left anterior descending (LAD) artery had 60% occlusion, and the mid LAD had 90% occlusion. The diagonal branch was normal. The left circumflex (LCx) artery had total occlusion (CTO). The first obtuse marginal (OM1) branch had 60% stenosis, while the second obtuse marginal (OM2) branch was filled retrogradely from the diagonal. The proximal right coronary artery (RCA) had subtotal occlusion, with total occlusion (CTO) in the distal RCA, which was filled via collaterals. The proximal-to-distal occlusion in the PDA was 90% in length, and the proximal-to-distal occlusion in the PL was also 90% in length.

Table 1. Laboratory Result

Laboratory Result		
Parameters	**Results**	**Normal Value**
WBC	6,4	4.5 – 11.5 x 10^3/uL
RBC	4,3	4.0 – 5.4 x 10^6/uL
Haemoglobin	13,2	12.0 – 15.0 g/dL
Hematocrit	40,3	35.0 – 49.0 %
Platelets	208	150 – 450 x 10^3/uL
Albumin	4,22	3.97 – 4.94 g/dL
BUN	16	6.0 – 20.0 mg/dL
Creatinin	1,13	0.50 – 0.90 mg/dL
GDS	110	80-140
Na/K/Cl	135/4,3/100	136-145/3,5-5,1/98-107
PPT	10.7 (k 11)	14-15,8
APTT	31,1 (k 31,2)	31-40
INR	0,98	0,9-1,1
OT/PT	12,1/15,3	<32/<33

Anesthesia Management

The viability and function of the heart depend upon the relatively delicate balance of oxygen supply and demand. The cardiac anesthesiologist can manipulate these determinants perioperatively to benefit the patient. The myocardium maximally extracts O2 from arterial blood at rest, with a coronary sinus blood PO2 of 27 mm Hg, and saturation less than 50%. Upon exertion or hemodynamic stress, the only way to increase O2 supply acutely to meet the greater myocardial energy demand is by increasing the coronary blood flow (CBF). When CBF does not increase sufficiently, anaerobic metabolism and ischemia ensue (Michael, S., *et al.*, 2019).

The following approach achieves the clinical goal of ensuring that O2 supply at least matches demand: 1. Optimize the determinants of myocardial O2 supply and demand; 2. Select anesthetics and adjuvant agents and techniques according to their effects on O2 supply and demand; 3. Monitor for ischemia to detect its occurrence early and intervene rapidly.

CBF varies directly with the pressure differential across the coronary bed (coronary perfusion pressure [CPP]) and inversely with coronary vascular resistance(CVR): CBF = CPP/CVR. However, CBF is autoregulated (i.e., resistance varying directly with perfusion pressure) so that flow is relatively independent of CPP between 50 and 150 mm Hg but is pressure dependent outside of this range. Metabolic, autonomic, hormonal, and anatomic parameters alter CVR, and hydraulic factors influence CPP. Coronary stenoses also increase CVR.

CPP equals the arterial driving pressure less the back-pressure to flow across the coronary bed. For the LV, the driving pressure is the aortic blood pressure during diastole. The back-pressure to flow depends on the area of myocardium under consideration. Because the endocardium is the area most prone to ischemia, attention focuses on its flow, and thus the usual formula for CPP uses left ventricular end-diastolic pressure (LVEDP) as back-pressure instead of right atrial pressure (RAP), despite the fact that most coronary venous blood returns to the heart via the coronary sinus (Berkowitz, 1998).

Typical monitoring for CABG surgery includes the standard American Society of Anesthesiologists (ASA) monitors and invasive arterial blood pressure monitoring. The most recent (2010) ASA/SCA practice guidelines recommend that TEE be considered for all CABG patients unless probe placement is contraindicated ("Practice Guidelines for Perioperative Transesophageal Echocardiography. An Updated Report by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Transesophageal Echocardiography.," 2010). The use of PA catheters for routine CABG has become variable. Detection and treatment of intraoperative ischemia is critically important because intraoperative ischemia is an independent predictor of postoperative myocardial infarction. Only half of intraoperative ischemic events can be related to a hemodynamic alteration and none can be detected by the presence of angina in anesthetized patients. Reduced or negative lactate extraction in a regional myocardial circulatory bed, while diagnostic of ischemia, cannot be routinely measured. Thus, we seek clues that ischemia leaves in its wake: changes on the ECG, PA pressure changes, and myocardial wall-motion abnormalities (Joel, K., 2017).

TEE can assess ventricular preload and contractility, detect myocardial ischemia-induced regional wall-motion abnormalities (RWMAs), evaluate the aortic cannulation site, detect concomitant valve pathology, detect the presence and pathophysiologic effect of pericardial effusion, aid the placement of intra-aortic balloon catheters and coronary sinus catheters, and detect the presence of ventricular aneurysms and ventricular septal defects. TEE has become an invaluable clinical tool and has achieved routine intraoperative use during CABG at most institutions. New RWMAs after bypass correlate with adverse outcomes (Allen, 2020).

General indications for a PA catheter for revascularization procedures. PA catheters provide central delivery of infusions (typically via a side port introducer or a proximal lumen in the catheter), measurement of blood temperature and chamber pressures, and calculations of cardiac output, vascular resistance, and RV ejection fraction (with special catheters equipped with particularly fast thermistors). Some catheters also continuously measure mixed venous oxygen saturation. Observational studies conclude that PA catheterization does not affect outcome. When clinicians were denied intraoperative access to PA catheter data unless the situation met strict criteria, access occurred in only 23% of patients, and management changed in fewer than 9% of all cases. Even if shown unnecessary for the intraoperative management of routine coronary bypass surgery, PA catheters achieve utility postoperatively, when TEE cannot be utilized (Michael, S., *et al.*, 2019) (Gibbs, NM, *et al.*, 2019).

Anesthetic effects on myocardial oxygen supply and demand. Outcome studies in cardiac surgery fail to reveal an effect of particular anesthetic agents. Cardiac anesthesiologists, keenly aware of the impact of anesthetic agents on myocardial oxygen supply/demand dynamics, effectively monitor for and treat myocardial ischemia, thus accommodating for any such effects. Propofol decreases systemic vascular resistance (SVR) and cardiac contractility and increases heart rate. Ketamine increases sympathetic tone, leading to increases in SVR, filling pressures, contractility, and heart rate. Myocardial O2 demand strongly increases, whereas O2 supply only slightly augments, thus producing ischemia. However, a patient already maximally sympathetically stimulated responds with decreased contractility and vasodilation. Ketamine is not recommended for routine use in patients with ischemic heart disease. However, it is sometimes used in patients with cardiac tamponade, because of its ability to preserve heart rate, contractility, and SVR. Midazolam (0.2 mg/kg) or diazepam (0.5 mg/kg) may be used to induce anesthesia. Although both agents are compatible with the goal of maintaining hemodynamic stability, blood pressure may decrease more with midazolam due to more potent peripheral vasodilation. Negative inotropic effects are inconsequential. Blood pressure and filling pressures decrease with induction, whereas the heart rate remains essentially unchanged. Addition of induction doses of a benzodiazepine to a moderate-dose opioid technique, however, may result in profound peripheral vasodilation and hypotension. Volatile agents In general, volatile anesthetics decrease both O2 supply and demand. The net effect on the myocardial supply/demand balance depends upon the hemodynamic profile that prevails at the time of administration (Michael, S., et al., 2019) (Gibbs, NM, et al., 2019).

All opioids except meperidine decrease heart rate by centrally mediated vagotonia; meperidine has an atropine-like effect. The dose of drug and speed of injection affect the degree of bradycardia. The result is decreased O2 demand. By releasing histamine, morphine or meperidine may elicit a reflex tachycardia that decreases O2 supply and increases O2 demand. Aside from meperidine, which decreases contractility, the opioids have little effect on contractility in clinical doses. Muscle relaxants, Rocuronium’s mild vagolytic action is typically clinically insignificant, and rocuronium administration does not cause significant hemodynamic perturbations (Michael, S., et al., 2019).

ICU management a traditional fast-track approach requires sedation with a relatively short-acting agent until the patient is ready for tracheal extubation, ideally with an agent devoid of significant hemodynamic effect. For an uncomplicated patient, tailor the level of sedation for extubation 4 to 6 hours after arrival, during whichtime the patient recovers from myocardial stunning, achieves normothermia, and demonstrates perioperative hemostasis. Propofol provides a smooth transition from intraoperative anesthesia to postoperative sedation. It is easy totitrate, with quick onset and offset of action, and minor hemodynamic effects at sedative doses. Supplemental nitroglycerin, nitroprusside, or clevidipine infusions can titrate blood pressure rapidly. Compared to low-dosemorphine, sufentanil analgesia in the early ICU period resulted in fewer and less severe ischemic events. When administered as a continuous infusion, dexmedetomidine, mimics natural sleep and significantly reduces use of analgesics, β-blockers, antiemetics, epinephrine, and diuretics. Studies comparing the safety and efficacy of dexmedetomidine and propofol for ICU sedation (including endpoints such as analgesic requirement reduction and hemodynamic changes) fail to substantiate the superiority of either approach, and show no difference in ventilator weaning time (Michael, S., et al., 2019).

DISCUSSION

We report a 68-year-old male patient diagnosed with Coronary Artery Disease (CAD), with total occlusion of the right coronary artery (RCA), total occlusion of the left circumflex artery (LCx), 60% occlusion in the proximal left anterior descending (LAD) artery, and 90% occlusion in the mid LAD. The patient also has Congestive Heart Failure (CHF) and a low ejection fraction (low EF), The TEE examination ejection fraction of 41% and is scheduled to undergo Coronary Artery Bypass Grafting (CABG).

Premedication, Long-acting agents are preferentially avoided. Same-day admission patients have in adequate time for sedation with slow-onset agents. Midazolam (0.03 to 0.07 mg/kg IV) usually suffices to allay anxiety.5 The patient was administered 3 mg of midazolam to reduce anxiety before the surgery, as anxiety can increase heart rate, which in turn raises oxygen demand.

The patient was transferred to the operating room in a stable condition. Leads for EKG, saturation, and NIBP monitoring were then installed. Initial hemodynamic measurements showed blood pressure of 145/90 mmHg, heart rate of 80 beats per minute, oxygen saturation of 98%, and respiratory rate of 17 breaths per minute. The EKG showed sinus rhythm with a heart rate of 90 beats per minute, and ST depression in leads II, V1-V4. An arterial line was placed in the right radial artery. The hemodynamic measurements before anesthesia induction were blood pressure of 150/90 mmHg with a pulse rate of 77 beats per minute.

Induction of anesthesia, Supplementation with a volatile agent or fentanyl (up to 7 μg/kg) provides more stable hemodynamics for tracheal intubation.5 In this patient with low ejection fraction, hypotension can easily occur during anesthesia induction, so vasodilating drugs such as propofol should be avoided. Anesthesia induction in this patient was performed using an opioid-based technique with a dose of 4-7 mcg/kg; in this case, fentanyl 300 mcg was administered and then maintained with the inhalation anesthetic agent sevoflurane using incremental doses. Hemodynamics were monitored to be stable during anesthesia induction and endotracheal intubation.

Intra-aortic balloon (IABP) counter pulsation increases CPP and decreases LV afterload. Patients with impaired ventricular function benefit from improved pump performance in addition to relief of ischemia.5 In this patient with low ejection fraction, the risk of unstable hemodynamics during anesthesia induction and intraoperatively is quite high. Therefore, mechanical support such as IABP may be beneficial. In this case, the hemodynamic condition was relatively stable, so the placement of an IABP could be considered for insertion after the revascularization surgery if the cardiac condition does not improve.

A central venous catheter was placed in the left subclavian vein, a side port was inserted in the right internal jugular vein, and a Swan-Ganz catheter was advanced to a depth of 50 cm. The patient was then fitted with a temperature probe, TEE probe, and urinary catheter. The initial TEE data revealed dilation of the left atrium (LA) and left ventricle (LV), with severe hypokinetic wall motion in the basal-mid-apical anteroseptal, basal-mid-apical anterior, mid-inferoseptal, apical inferior, and apical lateral regions. Mild mitral regurgitation (MR) and tricuspid regurgitation (TR) were observed. The Left Ventricle Ejection Fraction (LVEF) was approximately 47% (Simpson), tricuspid annular plane systolic excursion (TAPSE) was 16 mm, Cardiac Output (CO) was 3.57 L/min, Cardiac Index (CI) was 2.12 L/min/m², and Systemic Vascular Resistance (SVR) was 1275 dynes/sec/cm.

Maintenance of anesthesia. Volatile agent supplementation limits the total opioid dose to 10 to 15µg/kg fentanyl (or its approximate equivalent using sufentanil). The ultra–short-acting opioid remifentanil provides good hemodynamic stability, adequate attenuation of the neurohumoral stress response, and early awakening. However, a short half-life and rapid tolerance necessitate substantial opioid administration postoperatively. Reliance on a volatile agent can lead to a hyperdynamic state during transport or upon ICU arrival, potentially prompting the use of long-duration sedatives by the ICU staff (Michael, S., et al., 2019).

Intraoperative awareness**.** Significant intraoperative awareness occurs in 0.3% of fast-track patients, similar to that observed in general surgery (Michael, S., et al., 2019). When using moderate doses of opioids, matching the depth of anesthesia to the operative stimulus at different times will avoid harmful hemodynamic responses; volatile agents provide this flexibility. A vaporizer attached to the cardiopulmonary bypass (CPB) circuit facilitates appropriate anesthetic depth during bypass with moderate hypothermia. The role of continuous processed EEG monitoring such as bispectral index (BIS, Aspect Medical Systems, Natick, MA, USA)remains unclear, although many centers have embraced its use.

During Surgery, Up to cardiopulmonary bypass (CPB), hemodynamics were relatively stable with a systolic blood pressure of 80-100 mmHg, diastolic blood pressure of 40-60 mmHg, heart rate of 100-110 beats per minute, oxygen saturation of 95-99%, and CVP of 7-10 mmHg. After sternotomy, heparin 26,800 IU (400 IU/kg) was administered with a target activated clotting time (ACT) > 480 seconds. Cannulation of the aorta and right atrium was performed, and preparation for cardioplegia was made. Cold blood cardioplegia was administered antegrade through the coronary ostia at a volume of 1500 cc. The patient received CABG with Classic grafts: LIMA-LAD, SVG-OM, and SVG-PDA. After releasing the aortic cross-clamp, TEE showed improvement in LV contraction. The patient was successfully weaned from CPB with dobutamine support at 5 mcg/kg/min, and wall motion in the basal-mid anteroseptal region improved with LVEF approximately 52% (Simpson).

The patient was transferred to the ICU intubated, with the vasoactive agent dobutamine at 5 mcg/kg/min. Hemodynamics in the ICU were monitored with blood pressure at 110/50 mmHg, heart rate at 90 beats per minute, CVP at 6 mmHg, and oxygen saturation at 100%. The patient was on mechanical ventilation with the mode set to pressure synchronized intermittent mandatory ventilation (PSIMV). The patient was treated in the ICU for 2 days. During the treatment, hemodynamic stabilization and clinical condition optimization were performed, including transfusion of Packed Red Cells (PRC), correction of hypokalemia, glucose level correction, escalation of antibiotics, and adjustment of vasoactive and vasopressor medications according to the hemodynamic profile. The patient was sedated until the critical phase was over on the first day of ICU care. On the first day, the patient underwent ventilator weaning and successfully achieved spontaneous mode. On the second day, the patient was transferred to the Intermediate Cardiac Care Unit (ICCU) in good condition with nasal cannula (consciousness level GCS E4V6M5) and without vasoactive and inotropic support.

CONCLUSION

Anesthesia management in CABG patients with low ejection fraction presents a unique challenge. Patients with low ejection fraction are at high risk for mortality and postoperative complications, The principle of anesthesia managemen is to maintain a balance between myocardial oxygen supply and demand. This operation requires collaboration and good communication between the surgeon and the anesthetist. The anesthesia management and the reasons for postoperative complications in this case need to be further evaluated.

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