ANAESTHETIC MANAGEMENT FOR PATIENT WITH SEVERE MITRAL STENOSIS UNDERGO ISTHMOLOBECTOMY OPERATIONS: CASE REPORT

Jorza Sepmiko*, Dewa Ayu Mas Shintya Dewi* and Rindha Dwi Sihanto**,1

* Department of Anesthesiology, Udayana University, Sanglah General Hospital, Bali, Indonesia, ** Department of Neurology, Udayana University, Sanglah General Hospital, Bali, Indonesia

ABSTRACT A 55-year-old female patient diagnosed with a solitary thyroid nodule accompanied with severe mitral stenosis due to a history of rheumatic heart disease was planned to undergo isthmolobectomy surgery with anaesthesia. Patients were assessed for American Society of Anesthesiologists (ASA) III physical status. General anaesthesia is performed with Endotracheal Tube (ETT) Non-King-King No. 7, breath control with muscle relaxants. Premedication with 1 mg midazolam and 150 mcg fentanyl, induction with 10 mg Propofol, and intubation with 40 mg Rocuronium. Maintenance with Oxygen, Isoflurane, Fentanyl 0.5 mcg / kg IV every 45-60 minutes continuously and Atracurium 0.15 mg / kgBW IV every 30-45 minutes continuously. The surgery lasted for about 2 hours. During surgery, the hemodynamic is relatively stable with a systolic blood pressure of 100-120 mmHg, a diastolic blood pressure of 45-70 mmHg, heart rate (HR) between 60-75 × / minute and oxygen saturation between 98-100%, bleeding during surgery approximately 200 cc, and urine output ± 200 cc. Postoperatively the patient is treated in the intensive room.

KEYWORDS general anaesthesia, isthmolobectomy, mitral stenosis

Introduction

Rheumatic Heart Disease (RHD) has high morbidity and mortality rates in developing countries, including Indonesia. Rheumatic Mitral Stenosis (RMS) is one of the most common heart valve diseases in RHD. However, the available research data on RHD in Indonesia is still scant. Brillianti (2018) examined at Dr M. Djamal Padang in 2012-2017 the incidence of RMS was 62% of all cases of mitral stenosis (MS), with the majority of RMS patients having severe stenosis (mean Mitral Valve Area (MVA) 1 ± 0.5 cm2). The most common complication for RMS patients is pulmonary hypertension, and other rheumatic valve abnormalities that often accompany RMS is mitral regurgitation. In India, the incidence of RHD is 6: 1000, with nearly a third showing symptoms and signs of RMS and MS. In developed countries, the prevalence of MS detected through echocardiography with all causes amounted to 0.02-0.2%. [1]

The implications of MS for anaesthesia include: first filling of the left ventricle in this patient is highly dependent on atrial contraction. Changes to sinus rhythm must be accomplished with either medication or cardioversion. Tachycardia and bradycardia can cause decreased left ventricular filling. However, on the other hand, patients with MS have increased left atrial pressure so aggressive that the fluid administration can cause heart congestion and pulmonary oedema. [2,3] Also, the heart rate, the blood flows through the mitral valve occurs during the ventricular diastolic period. Tachycardia will shorten the diastolic period by increasing the heart rate. The blood flow through the stenotic mitral valve must be increased to maintain cardiac output. To increase the flow, the left atrial pressure must also be increased. High pressure in the left atrium will increase pulmonary oedema. At the same time, bradycardia is dangerous because the stroke volume is relatively persistent.
If atrioventricular pacing is initiated in these patients, a long PR interval (0.15-0.20 msec) will optimize sufficient volume of blood flow through the stenotic mitral valve after atrial contraction. A decrease in the PR interval can reduce diastolic flow, resulting in a decrease in cardiac output. [3] A long PR interval (0.15-0.20 msec) will optimize the volume of sufficient blood flow through the stenotic mitral valve after atrial contraction. A decrease in the PR interval can reduce diastolic flow, resulting in decreased cardiac output.

The other thing one should consider is contractility. Adequate blood flow will depend on the contractility of the right and left ventricles. Chronic low filling of the left ventricle will cause deconditioning in depressed ventricular contractility even though there has been improvement in filling. In severe MS, depression of left ventricular contractility can result in severe congestive heart failure. Depression of right ventricular contractility limits left atrial filling and cardiac output. Many patients require inotropic agents before and after cardiopulmonary bypass. [3]

Maintenance of blood pressure with limited cardiac output in patients with MS will usually experience an increase in Systemic Vascular Resistance (SVR). Decreased afterload will not improve blood flow because it is mitral valve stenosis that limits cardiac output. It is recommended that the afterload be kept within normal limits in these patients. Patients also tend to increase Peripheral Vascular Resistance (PVR) and are prone to pulmonary vasconstriction when hypoxic. So it needs to be considered to avoid increasing pulmonary artery pressure due to inadequate anaesthesia or acidosis, hypercapnia, hypoxemia, or hypothermia. [2,3]

Management of patients with valve defects during the perioperative period requires understanding the hemodynamic changes accompanying valve dysfunction. The choice of anaesthetic technique in this setting considers the minimal change in hemodynamic status. In this case report, we try to discuss anaesthesia in mitral stenosis.

**Case Report**

A 55-year-old woman with complaints of 4 years felt a lump in her right neck. The patient went to the doctor and was given Tyrosol therapy 2 mg every 24 hours orally. After 1 year of therapy, the patient examined his heart by echocardiography and found RHD in mitral stenosis. The patient was given Warfarin 2 mg every 24 hours, Spironolactone 25 mg every 24 hours orally and Propanolol 20 mg every 24 hours orally. The patient’s lump was not visible and could no longer be felt. There were no complaints of shortness of breath, palpitations, or pain in the throat for the last 3 months.

The patient was alert, the respiration rate (RR) was 18x / minute; symmetrical; vesicular, rhonchi and wheezing absent, oxygen saturation 99% room water, Sabrazes test 25 seconds, blood pressure 120/70 mmHg, pulse 80 x / min; murmur (+), gallop (+) Mitral-tricuspid valve. Laryngoscopy evaluation results showed no visible mass in the neck (Figure 1) with mallampati 1 (Figure 2). Patients with American Society of Anesthesiologists (ASA) III physical status.

Laboratory results showed thyroid function Free Thyroxine (FT4) 1.2 ng / dL (0.7-1.48); Thyroid Stimulating Hormone (TSH) 2.176 nIU / mL (0.35-4.94) and physiostasis Plasma Prothrobine Time (PPT) 15.8 seconds (10.8-14.4); Activated Partial Thromboplastin Time (aPTT) 30.7 seconds (24-36); International Normalized Ratio (INR) 1.32 (0.9-1.1). The posteroanterior (PA) Thorax radiograph (Figure 3) shows Cardiomegaly with a suspected right pleural effusion. The results of Ultrasonography (USG) (Figure 4) obtained multiple partial solid nodules with a calcification component on the edges (the largest size was 1.23 x 1.13 x 1.58 cm); Enlargement of multiple subcentimeter lymph nodes in the right-left colli region, suggesting an atypical lymphadenopathy.

Electrocardiogram (EKG) (figure 5) Atrial Fibrillation (AF) Normo Ventricular Response, Heart Rate (HR) 75x / minute, ST-T change is not there, Axis deviation to the right. Echo (figure 6) dimensions of cardiac space.

- Left Atrium (LA) Dilatation; Left Ventricular Hypertrophy (LVH) concentric remodelling; Left Ventricular (LV) normal systolic function (Ejection Fraction (EF) biplane 58.8%); LV undeterminate diastolic function; Decreased right ventricular (RV) con-
Patients with a diagnosis of Solitary Nodule Thyroid Dextra with MS Severe ec RHD (with severe calcification) were performed Dextra Isthmolobectomy with anesthetic techniques performed on patients with Bupivacaine 0.25% 10 ml each side, general anesthesia with Endotracheal Tube (ETT) non-king-king no 7 premedications with Midazolam 1mg intravenous (IV), Dexamethasone 10 mg IV, Dphenhydramine 10mg IV, Vi- tamin K 10mg IM. Analgesics; Fentanyl 150mcg IV. Induction; Propofol is titrated until the patient is hypotnicated. Facilitate Intubation: Rocuronium 40 mg IV, Maintenance: Oxygen (O2): Compressed Air; Sevoflurane; fentanyl intermitttent 0.5 mcg / kg IV every 45-60 minutes; Rocuronium intermittennt 0.15 mcg / kg IV every 30-45 minutes. Other medications; Ondansetron 4mg IV. Operation time 1 hour 35 minutes with 2 hours of anaesthesia. Postoperative hemodynamic results of patients with a heart rate of 70-90 times per minute, blood pressure 120-140 / 75-95 mmHg, respiratory rate 16 times per minute. Oxygen saturation 91-94%. The results of the surgery for the solitary thyroid nodule.

Postoperative patients were given Fentanyl 300mcg + Ket-amine 20mg in 50c NS at a rate of 2.1 cc/hour, Paracetamol 1g every 8 hours intravenously and continued treatment in the Intensive Ward. The patient was hemodynamically stable within 1x24 hours, so that he was treated in the normal room and 3 days later the patient was allowed to go home.

**Discussion**

In this patient, there are several problems that affect the management of anesthesia, Solitary Nodule Thyroid Dextra suffered by the patient, prediction of difficulty in intubation, mitral stenosis with various complications.

This patient has been suffering from Dextra’s Solitary Nodule Thyroid since 4 years prior to the day of surgery so the condition that affects Anesthesia management is that thyroid hormone levels must be within normal limits to reduce the residual rate of thyroid storm events. In this patient, he received 2 mg of Tyrosol treatment every 24 hours orally and lastly + 3 months of SMRS so that the thyroid function results of FT4 1.4 ng / dl (0.7-1.48); TSH 2.176 nIU / ml (0.35-4.94), so that general anesthesia can be performed (Figure 7) [4]

The diagnosis of mitral stenosis is obtained from physical examination and investigations. From the history, there were no known symptoms of pulmonary congestion during the examination 1 year ago. From the physical examination of the heart, the blood pressure was 120/70 mmHg, pulse 80 × / min; Regular single S1 S2, murmur (+), gallop (+) Mitral-tricuspid valve. The differential diagnosis for diastolic bruits is tricuspid stenosis, and flow murmurs (caused by increased blood flow through the mitral or tricuspid valve, namely mitral regurgitation, tricuspid regurgitation, Artrial Septal Defect (ASD), Ventricular Septal Defect (VSD), and Patent Ductus. Artriosus (PDA).[5]

Patients received Warfarin 2 mg every 48 hours orally (after they stopped 5 days before surgery), Spironolactone 25 mg every 24 hours orally, Propanolol 20 mg every 24 hours orally. Of the drugs given, only Warfarin was an anticoagulant which was stopped 5 days before surgery while the other drugs were continued until the day of surgery.

On the EKG examination, the AF Normal Ventricular Re- sponse results were obtained, HR 75x / minute, no ST-T change, Axis Deviation to the right. In MS patients, atrial fibrillation can occur if the left atrium has thickened. Atrial fibrillation in this patient can be controlled with Spironolactone 25 mg every 24
hours orally and Propanolol 20 mg every 24 hours orally. Decreasing the rate of blood flow in the atria increases the risk of intra-atrial thrombus formation and systemic embolism. [2,6]

On echocardiography, there was severe MS with thrombus in LA and LAA, so this patient was treated with anticoagulants. Therefore, the anesthesiologist must know the function of the coagulation factors in this patient before surgery by examining the PTT, aPTT, and INR. This patient had a PPT of 15.8 seconds (10.8-14.4); APTT 30.7 seconds (24-36); INR 1.32 (0.9-1.1). As mentioned above, the goals of perioperative anesthesia management in these patients are to prevent preload reduction, prevent tachycardia, maintain right and left ventricular contractility, keep SVR within normal limits, and avoid an increase in PVR. The premedication drug is an analgesic, namely Fentanyl 150mcg IV, then induction with propofol is titrated until the patient is hypnotized.

The patient was intubated with Rocuronium 40 mg IV and maintenance anesthesia in these patients using oxygen; Compressed Air; Sevoflurane; Fentanyl intermittent 0.5 mcg/kg IV every 45-60 minutes; Rocuronium intermittent 0.15 mg/kg IV every 30-45 minutes. The ideal inhalation anesthesia for patients with MS is Sevoflurane because it has minimal cardiovascular effects (Morgan GE, 2018). In addition, the patient was also given BPSS with Bupivacaine 0.25% 10 ml on each side. What must be considered is that the depth of anesthesia must be sufficient to blunt the sympathetic response and avoid vasodilation and systemic myocardial depression.[6]

Nitrous Oxide (N2O) is not used to maintain anesthesia in these patients because N2O can stimulate the sympathetic nervous system by increasing endogenous catecholamines, depressing the myocardium, and reducing the Fraction of inspired oxygen (FiO2). [5] Continuous Fentanyl was administered to provide adequate analgesia in this patient. This patient will be planned for extubation because the preoperative examination shows that the patient's respiratory function is still good even though he has pulmonary oedema. However, the Arterial Blood Gas (ABG) examination shows the patient's oxygenation, ventilation, and perfusion are still quite good.[5]

Then at the end of the operation, oxygen saturation showed 99-100%, adequate fluid balance, Central Venous Pressure (CVP) 11, hemodynamically stability, and adequate ventilation so that extubation was decided. In this patient, deep extubation was performed. The extubation process in this patient has its problems. Because the patient must avoid the hemodynamic increase due to extubation, it is advisable to deep extubation. But extubation is in contradiction with this patient because this patient is considered difficult to intubate. If the ventilation is inadequate after extubation can cause hypoxia and hypercapnia, leading to pulmonary hypertension, which can eventually result in acute right ventricular failure. Deep extubation was carried out in this patient, considering adequate ventilation prior to extubation (respiratory rate> 8 x / min, tidal volume> 6 cc / kgBW), and at induction, this patient could be adequately ventilated with a face mask. So that if the ventilation is inadequate after extubation, a face mask can still be assisted.

Postoperative care for this patient is in an Integrated Intensive Room to receive intensive care and monitoring, as well as to ensure the achievement of the hemodynamic goals that have been conveyed in advance. The postoperative analgesic given is Fentanyl 300mcg + Ketamine 20mg in 50c NS at a rate of 2.1 cc/hour, Paracetamol 1g every 8 hours intravenously according to patient needs.

Conclusion

Valvular heart disease, particularly mitral stenosis and its accompanying complications such as heart failure and atrial fibrillation, can increase perioperative morbidity and mortality. Good preoperative assessment, adequate perioperative monitoring, and early management of complications can prevent side effects and improve patient outcomes. In patients with mitral stenosis, Anaesthetic management includes maintaining normal sinus rhythm and heart rate, normal intravascular fluid volume, and avoiding increased PVR.

Informed consent and patient details

The authors declare that this report does not contain any personal information that could lead to identifying the patient(s) and/or volunteers.

Funding

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

References

1. Permataranny M, Yanni M, Permana H. Profil Penderita Stenosis Mitral Reumatik di RSUP Dr. M. Djamil Padang


