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Case Report

Perioperative Challenges in Severe Preeclampsia Patients with Rheumatic Heart Disease Undergoing Cesarean Section – A Case Report

Tantangan Perioperatif pada Pasien Preeklamsia Berat dengan Penyakit Jantung Rematik yang menjalani Prosedur Seksio Sesarea – Laporan Kasus

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Abstract

Rheumatic heart disease (RHD) is a major contributor to maternal morbidity and mortality in developing countries, including Indonesia. Severe preeclampsia further complicates management by exacerbating cardiovascular strain and increasing the risk of adverse outcomes for both mother and fetus. This case report highlights the importance of multidisciplinary collaboration and careful perioperative planning for pregnant women with RHD, particularly in resource-limited settings. We report the case of a 31-year-old woman (G3P2A0) at 40–41 weeks of gestation, diagnosed with severe preeclampsia, severe mitral stenosis, moderate mitral regurgitation, and severe tricuspid regurgitation due to RHD. An elective cesarean section was performed under epidural anesthesia with 0.75% ropivacaine, ensuring hemodynamic stability throughout the procedure and during a 24-hour ICU observation. Despite limited access to cardiovascular specialists and surgical options, a team-based approach and tailored anesthetic management ensured a favorable outcome. In conclusion, this case demonstrates that even in settings with constrained resources, proper planning, close monitoring, and multidisciplinary coordination can mitigate the risks associated with multivalvular heart disease and severe preeclampsia in pregnancy. Interdisciplinary collaboration and individualized anesthetic strategies are crucial for optimizing maternal and fetal outcomes in such complex scenarios.

Keywords*: cardio-obstetrics; epidural anesthesia; maternal mortality; perioperative management; rheumatic heart disease.*

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Abstrak

Penyakit Jantung Reumatik (PJR) merupakan salah satu penyebab utama morbiditas dan mortalitas maternal di negara berkembang, termasuk Indonesia. Preeklampsia berat semakin memperumit penanganan karena memperburuk beban kardiovaskular dan meningkatkan risiko hasil buruk bagi ibu dan janin. Laporan kasus ini menyoroti pentingnya kolaborasi multidisiplin dan perencanaan perioperatif yang cermat untuk wanita hamil dengan PJR, terutama di fasilitas dengan sumber daya terbatas. Kami melaporkan kasus seorang wanita berusia 31 tahun (G3P2A0) pada usia kehamilan 40–41 minggu dengan preeklampsia berat, stenosis mitral berat, regurgitasi mitral sedang, dan regurgitasi trikuspid berat akibat PJR. Operasi sesar elektif dilakukan dengan anestesi epidural menggunakan ropivakain 0,75%, yang memastikan stabilitas hemodinamik selama prosedur dan observasi ICU selama 24 jam. Meskipun terdapat keterbatasan akses ke spesialis kardiovaskular dan opsi bedah, pendekatan berbasis tim dan manajemen anestesi yang disesuaikan menghasilkan hasil yang baik. Sebagai simpulan, kasus ini menunjukkan bahwa bahkan dalam lingkungan dengan keterbatasan sumber daya, perencanaan yang tepat, pemantauan ketat, dan koordinasi multidisiplin dapat mengurangi risiko terkait penyakit jantung katup ganda dan preeklampsia berat pada kehamilan. Kolaborasi multidisiplin dan strategi anestesi yang terindividualisasi sangat penting untuk mengoptimalkan hasil maternal dan janin dalam kasus yang kompleks seperti ini.

Kata kunci: anestesi epidural; kardio-obstetri; kematian ibu; manajemen perioperatif; penyakit jantung rematik.

Introduction

Acute rheumatic fever (ARF) is an abnormal immune response to infection with group A beta-hemolytic streptococcus bacteria, which can affect multiple organ systems, including the nerves, muscles, skin, and heart. Repeated or severe episodes of ARF can lead to rheumatic heart disease (RHD), a chronic valvular heart disease caused by damage to the heart valves. RHD is more common in developing countries, where it causes approximately 250,000 deaths annually and is the most common heart disease amongindividuals under 25 years old.[1–3] In developing countries with a high prevalence of rheumatic fever, cardiac complications can complicate approximately 5.9% of pregnancies, with high maternal mortality occurring during or after delivery. Additionally, RHD can increase the risk of developing preeclampsia, while preeclampsia, in turn, can exacerbate the cardiovascular burden, leading to worsened maternal and fetal outcomes.[4–6] Therefore, consideration of cardiac conditions is essential for anesthesiologists, as medications used to manage pain during labor and delivery can have a major impact on maternal and newborn prognosis.[7] Appropriate administration of anesthesia and analgesia plays a crucial role in reducing maternal and newborn mortality and morbidity.[8] This case report aims to highlight the importance of multidisciplinary collaboration and proper perioperative management in pregnant women with RHD, especially in resource-limited settings.

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Case

A 31-year-old female patient with a body weight of 72 kg presented with complaints of full-term pregnancy and a history of shortness of breath. The patient was referred to the anaesthesia department for a pregnancy termination plan. One month prior, the patient complained of shortness of breath. Particularly during activity, the patient experienced shortness of breath, which subsided at rest. The midwife had previously provided ANC (antenatal care) to the patient three times, and following a period of shortness of breath, the midwife advised the patient to undergo a follow-up examination at the hospital. The patient was then diagnosed with heart disease and given furosemide, spironolactone, and candesartan. Later on, the patient reported symptoms such as shortness of breath, chest palpitations, or chest pain. History The patient was pregnant with her third child and already has two other children. Her previous delivery was spontaneous. She denies any prior history of heart disease. The patient has never undergone surgery and anesthesia before.

On physical examination, the respiratory rate was 18x/min, and SpO2 was 98% in room air. Blood pressure was 141/97 mmHg. Heart sounds included regular S1 and S2, with a mid-diastolic murmur at the apex of the heart and a pan-systolic murmur at the left lower sternum border. Pretibial edema was observed in both lower extremities.

Laboratory examination showed hemoglobin of 9.9 g/dL, hematocrit of 31.3%, leukocytes of 9.700/uL, platelets of 257.000/uL, prothrombin time of 11.9 seconds, and activated partial thromboplastin time of 40.4 seconds. Urine examination revealed urine protein +1.

A 12-lead ECG (Figure 1) showed: sinus rhythm tachycardia with a QRS rate of 127 beats per minute, right axis deviation (RAD), positive mitral P wave, PR interval of 0.16 seconds, QRS duration of 0.06 seconds, no ST-T changes, and a positive for poor R-wave progression (PRWP).An echocardiography examination revealed Left ventricular ejection fraction (LVEF) of 60%, severe mitral stenosis due to rheumatic heart disease, moderate mitral regurgitation, severe tricuspid regurgitation, a high probability of pulmonary hypertension, moderate aortic regurgitation, mild pulmonary regurgitation, decreased right ventricular (RV) function, with a tricuspid annular plane systolic excursion (TAPSE) of 10 mm. The echocardiography figure can be seen in Figure 2.

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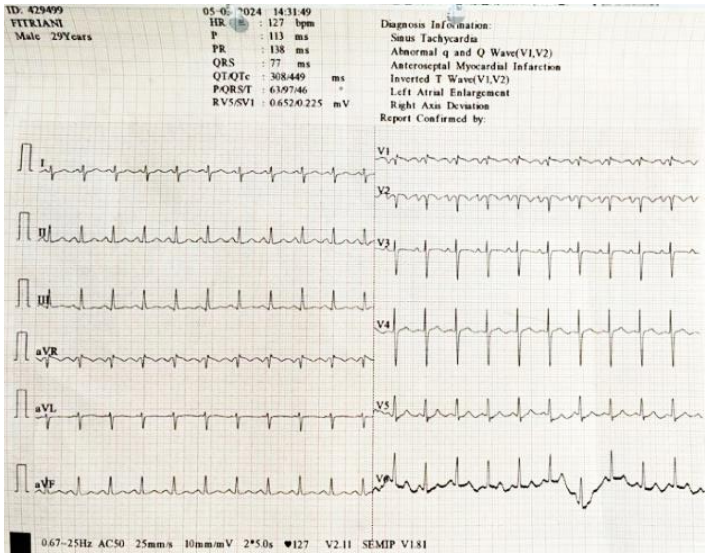

Figure 1 A 12-Lead ECG of the Patient

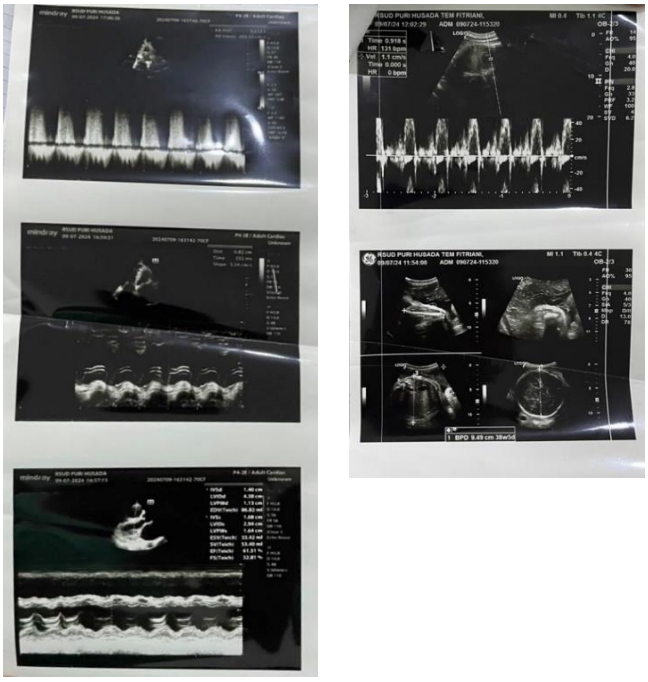

Figure 2 Transthoracic Echocardiography Of The Patient

The patient was diagnosed with G3P2A0 gravid 40-41 weeks with severe preeclampsia, severe mitral stenosis, moderate mitral regurgitation, and tricuspid regurgitation due to rheumatic heart disease. From the cardiologist, the patient received spironolactone 1 x 25 mg, furosemide 1 x 40 mg, and candesartan 1 x 4 mg. The cardiovascular risk was high. We assessed the patient using ASA IV and planned RA-Epidural anesthesia management. We gave the patient premedication of ondansetron 4 mg IV and ranitidine 50 mg IV. The patient was positioned sitting

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on the operating table. The anesthetic begins with the administration of local anesthesia containing lidocaine HCl 2% in the L3-L4 region, followed by the insertion of an epidural needle (Tuhoy) from the skin into the epidural space using the hanging drop technique. We inserted the epidural catheter (6 cm deep) into the epidural space. Next, we administered a test dose of 1.2 ml of pehacaine, 1 ml of lidocaine, and 0.8 ml of distilled water. Then the patient was positioned supine. We incrementally administered 0.75% ropivacaine in 2 initial administrations, 6ml every 5 minutes for a total initial volume of 12ml, targeting a height of 6 thoracic dermatome blocks. Bromage score 3 was achieved within 10 minutes, Bromage 2 within 15 minutes, and Bromage 1 was achieved within 20 minutes after administration of the anesthetic agent. We completed the T6 block height in 25 minutes. A nasal cannula oxygenated the patient at 3L/min. Maintenance fluids were given 1-2 ml/kgb/hour and blood loss was replaced with crystalloid fluids. total intraoperative bleeding was 200ml with a total admission of 300ml. Intraoperative data are presented in Table 1. Figure 3 shows the patient's hemodynamics during surgery.

The surgical procedure lasted 50 minutes and was conducted efficiently under regional anesthesia, achieving the highest sensory block level at T6 within 25 minutes. This level of anesthesia is appropriate for cesarean delivery, ensuring adequate pain control. Motor block assessment showed a Bromage score of 2 within 15 minutes, indicating partial motor block suitable for the procedure. The newborn had excellent outcomes, with APGAR scores of 8 and 9 at 1 and 5 minutes, respectively, and a healthy birth weight of 3000 grams. Maternal hemodynamics remained stable throughout the surgery, with no episodes of hypotension or bradycardia reported. Blood loss was minimal at 200 cc, and urine output of 100 cc indicated adequate renal function and fluid balance. Overall, the surgical and anesthetic management ensured safe and effective outcomes for both the mother and the baby.

Table 1 Patient's Intraoperative Data

Surgical time	50 minutes
Highest sensory block level	T6
Time to reach the highest sensory block	25 minutes
Time to reach Bromage 2	15 minutes
APGAR score	8/9
Birth weight	3000 grams
Hypotension/bradycardia	None
Amount of bleeding	200 cc
Urine production	100 cc

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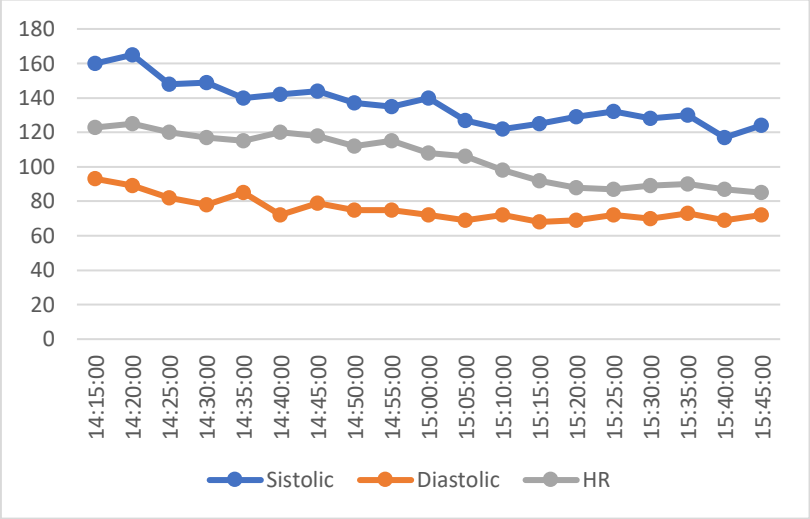

Figure 3 Intraoperative Patients' Hemodynamics

Postoperatively, the patient was positioned head up 30˚ and monitored in the ICU. Paracetamol drip (1 gram/6 hours IV) and Ropivacain 0.25% 2 ml/hour intraepidural with a syringe pump were administered as post-op pain management. Monitoring within 24 hours revealed the patient to be stable, with no complaints of shortness of breath or chest pain. The patient was then transferred to the regular ward. On the 4th postoperative day, the patient was discharged.

Discussion

During pregnancy, significant physiological changes occur in the cardiovascular system to support the growing fetus. These changes begin in the first trimester and continue until the last trimester. Blood volume increases by 35–50%, with plasma volume rising by 40–54%, resulting in enhanced circulatory capacity. The heart rate increases by 15–20%, while stroke volume rises by 30%, contributing to a marked increase in cardiac output by 30–50%. These changes ensure adequate perfusion to both maternal tissues and the placenta. Concurrently, pulmonary vascular resistance decreases by 15%, and systemic vascular resistance reduces by 15–20%, promoting efficient blood flow. Systemic blood pressure undergoes a slight decrease of approximately 5%, reflecting the combined effects of vascular resistance changes. Additionally, myocardial oxygen consumption increases, highlighting the elevated metabolic demands on the maternal heart during pregnancy. These adaptive mechanisms are essential to meet the physiological needs of pregnancy while maintaining maternal and fetal well-being..[9]

Approximately 0.9% to 3.7% of pregnant women suffer from cardiovascular disease.[10] Preeclampsia and rheumatic heart disease (RHD) are two serious conditions that can complicate

pregnancy, and when present together, they significantly increase maternal morbidity and mortality.[4,11] RHD, often a consequence of repeated or severe episodes of acute rheumatic fever, leads to chronic valvular heart disease, typically affecting the mitral and aortic valves. These valvular abnormalities can impair cardiac function and increase the risk of complications during pregnancy, such as preeclampsia.[12] Studies have shown that women with RHD are at a higher risk of developing preeclampsia, likely due to the added strain on the cardiovascular system from both the pregnancy and the underlying heart disease.[11,13] Preeclampsia, a hypertensive disorder of pregnancy, can further exacerbate the cardiovascular burden in these patients by increasing systemic vascular resistance and placing additional stress on the heart, especially in those with compromised valve function. The presence of both conditions can lead to worsened outcomes, including heart failure, stroke, or adverse fetal outcomes, requiring careful monitoring and management by a multidisciplinary team to optimize maternal and fetal health. Effective management often involves controlling blood pressure, preventing fluid overload, and ensuring appropriate anesthesia and delivery planning[11–14]. Therefore, the interaction between RHD and preeclampsia highlights the importance of vigilant prenatal care and tailored interventions to reduce risks associated with these coexisting conditions.[14]

In developing countries, rheumatic heart disease is the most common heart disease in pregnant women and the most important cause of maternal mortality.[7] Pregnant women with valvular heart disease have poor morbidity and mortality of maternal and fetal outcomes, especially if mitral stenosis occurs. The maternal mortality rate is reported to be more than 10%, and the rate of cardiac events is as high as 67%.[15] Severe preeclampsia in these patients adds an additional layer of complexity, as it can exacerbate hemodynamic instability and increase the risk of heart failure or stroke. Anesthesiologists must carefully consider the patient's blood pressure management, fluid balance, and choice of anesthesia, such as regional versus general anesthesia to minimize cardiovascular strain and improve maternal and fetal outcomes.[8,16,17]

According to the 2023 American Heart Association (AHA) recommendations, a multidisciplinary team of pregnancy cardiologists should develop a care plan and conduct an individualised assessment for cardio-obstetric patients going into labour. The pregnancy cardiologist team consists of cardiologists, obgyns, fetomaternalists, primary care experts, nurses, especially critical care obstetric nurses, pharmacists, and anesthesiologists. All team members ideally work together to develop an individualised antepartum, delivery, and postpartum care plan for patients with cardiac disease.[18] In this case, the patient had been referred from obstetrics to cardiology and anaesthesia for delivery planning. From the cardiac field, the patient was categorised as high risk for cardiac events. Based on the Modified World Health Organization

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(mWHO) Risk Classification for Cardio-Obstetric Patients, the patient was classified as class IV, indicating that delivery should occur in a hospital with a multidisciplinary team of pregnancy cardiologists. The AHA also recommends that patients with severe mitral stenosis consult a cardiovascular anesthesiologist for careful planning.[18] However, in this case, it was not possible because there was no cardiovascular anesthesiologist and the patient could not be referred to a tertiary hospital due to the distance. In a situation of limited resources, we tried to reduce the hemodynamic consequences by regional selection of epidural anaesthesia.

The hemodynamic targets in patients with stenosis and regurgitation are to maintain aortic diastolic blood pressure at baseline, normal sinus rhythm, and avoid hypertension and bradycardia.[18] In addition, the main goal of anaesthetic procedures in patients with severe MS and moderate MR undergoing caesarean section is to maintain pulmonary capillary pressure to avoid the occurrence of acute pulmonary edema.[7] Therefore, the use of general anaesthesia should be avoided. General anaesthesia may result in decreased cardiac contractility and increased pulmonary vascular resistance through positive pressure ventilation. Laryngoscopy and intubation as well as aspiration can result in hemodynamic changes in patients undergoing general anesthesia. The use of opioids during induction can cause respiratory depression in neonates, while extubation can cause delayed awakening from anaesthesia and increase the likelihood of postoperative mechanical ventilation use in patients. Increased preload due to autotransfusion after uterine contractions during labour can result in pulmonary edema, which only occurs after extubation as intraoperative positive pressure ventilation prevents this from happening.[19] Additionally, according to AHA 2023, patients with mWHO class III-IV have a variety of anaesthesia options, including epidural techniques, spinal-epidural techniques with intrathecal opioids and epidural local anesthetics, or combined spinal-epidural techniques. In this case, choosing epidural anaesthesia is appropriate.[20] However, in the presence of severe preeclampsia, careful monitoring of blood pressure and fluid status is essential to avoid exacerbating hypertension and to prevent complications such as cerebral edema or eclampsia, which could be triggered by the anesthesia technique.[16]

The problem associated with neuraxial blockade is hemodynamic disturbances. Epidural anaesthesia is generally preferred over spinal anesthesia. Epidural anaesthesia has an advantage over spinal anaesthesia in that it can be administered in a titrated manner and provides better control of postoperative pain.[7,18,21] In addition, neuroaxial blockade is also recommended in patients with preeclampsia who will undergo a caesarean section. This technique helps to minimise circulating catecholamines and avoid potentially high-risk general anesthesia.[16]

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Neuraxial blockade in the form of graded epidural anaesthesia allows a gradual onset of blockade by avoiding hypotension through intermittent fluid boluses and the use of vasopressors.[15,21]

Adequate cardiovascular invasive monitoring is essential, and it should be performed and maintained in the postpartum period with the same criteria to reduce morbidity and mortality in patients. [10,21,22] Monitoring using intra-arterial blood pressure monitoring, an oximeter, and an ECG has been suggested by the American Society of Anesthesiology. Intra-arterial blood pressure monitoring is often used in patients with certain cardiac lesions, most of which are classified as mWHO class III or IV.[9] However, due to limited facilities, in this case, intra-arterial blood pressure monitoring could not be performed.

In this case, we used ropivacaine as the agent for epidural anaesthesia. Ropivacaine is a long-acting amide class local anaesthetic drug similar to bupivacaine in structure and pharmacodynamics. Ropivacaine has a greater degree of separation between motor and sensory blockade than bupivacaine and is used to relieve epidural pain during labour or caesarean section. Research conducted by Wang et al, showed that ropivacaine is more recommended due to its small effect on hemodynamics, shorter duration of sensory block and motor block, and lower incidence of side effects, which is beneficial for recovery and also provides safety to patients while undergoing treatment.

During the surgery, the patient remained hemodynamically stable. The patient was given postoperative care in the ICU for 1 day. The AHA's 2023 recommendations suggest admitting high-risk women to the intensive care unit during the postpartum period, particularly 24-48 hours postpartum, to prevent adverse events.[9] After being monitored for stability, the patient was transferred to the regular ward.

Conclusion

Anesthetic management in patients with severe preeclampsia and rheumatic heart disease, especially with severe valvular disorders, is challenging in resource-constrained settings. Hemodynamic targets in patients with stenosis and regurgitation include maintaining baseline aortic diastolic blood pressure, normal sinus rhythm, avoiding hypertension and bradycardia, managing new occurrences of atrial fibrillation, avoiding decreased SVR, hypovolemia, and fluid overload. Epidural anesthesia provides a safer alternative in patients with complex valvular lesions.

Preoperative preparation, selection of delivery technique, anesthesia technique, and postoperative care should be carefully planned and executed to avoid adverse events. This case highlights the critical role of multidisciplinary collaboration, involving obstetricians,

anesthesiologists, cardiologists, and intensivists, to ensure comprehensive care. Proper perioperative management includes thorough preoperative evaluation, careful hemodynamic monitoring during the procedure, and vigilant postoperative care to prevent complications. These elements, even in resource-limited settings, are essential for optimizing maternal and fetal outcomes in pregnant women with RHD and severe preeclampsia.

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