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Intensive Management of Postoperative Septic Shock in Patient with Secundum Atrial Septal Defect: A Case Report

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ABSTRACT

Background: Sepsis is a life-threatening organ dysfunction caused by an abnormal inflammatory response to infection. This study aimed to describe the intensive management of postoperative septic shock in secundum atrial septal defect patients. **Case presentation:** A 28-year-old woman complaining of pus discharge and reddish swelling in the scar after a cesarean section operation. The patient has a history of pulmonary hypertension and secundum ASD. While in the ICU, examination of vital signs found the patient was weak, comatose, conscious, blood pressure 80/55 mmHG (MAP 63), Respiration 28 times per minute, pulse 114 times per minute, temperature 38.6°C with 98% oxygen saturation with NRM 10 L/ and laboratory examinations obtained hemoglobin 8.6, leukocytes 14.870, platelets 236.000, hematocrit 24, albumin 2.4 and procalcitonin > 100. **Conclusion:** This study reported that septic shock is a life-threatening condition, especially in patients with congenital heart disease. Appropriate, rapid, and comprehensive treatment and addressing the source of infection are essential in managing sepsis shock.

1. Introduction

Sepsis is a life-threatening organ dysfunction caused by an abnormal inflammatory response to infection.¹ Sepsis is a significant challenge for public health. World Health Organization (WHO) declares sepsis a global health priority. Sepsis is a significant cause of morbidity and mortality in intensive care units (ICUs) and is associated with a poor prognosis. Studies in the UK and Germany have shown increased sepsis patients in recent years.²⁻⁴

Septic shock is a significant healthcare problem that affects millions of people worldwide every year. Approximately 48.9 million cases of sepsis and 11 million sepsis-related deaths were documented in

2017 worldwide. Sepsis is a life-threatening emergency with severe complications such as septic shock and multiple organ failure.^{5,6} Surgical site infection is one of the postoperative complications that can occur. Research by O'Brien et al. showed that patients with infection 30 days postoperatively had a 3.2-fold higher risk of developing infection within one year and a 1.9-fold higher risk of death compared to patients who did not experience infection within 30 days. Based on the 2021 healthcare-associated infection data results published, about a 3% increase in surgical site infection.⁷⁻⁹ This study aimed to describe the intensive management of postoperative septic shock in secundum atrial septal defect patients.

2. Case Presentation

A 28-year-old woman came to comprehensive emergency neonatal obstetrics at Dr. M. Djamil General Hospital Padang complaining of pus discharge and reddish swelling in the scar after a cesarean section operation. Previously, the patient had a cesarean section before, and the patient complained of swelling and redness of the surgical wound 7 days ago, accompanied by fever. The patient went to a private midwife practice and was given antibiotic therapy. Three days ago, the patient complained of an open surgical wound and oozing pus and smelling. Past medical history, patient with a history of pulmonary hypertension and secundum ASD. The patient had no DM, kidney failure, or heart disease history. Family history, no history of infectious diseases, heredity, or malignancy.

On vital sign examination, the patient was weak, compost mentis, conscious, with a blood pressure of 106/65 mmHG, breathing 20 times per minute, pulse 80 times per minute, temperature 37 degrees Celsius, BMI: 15.83 (underweight). On physical examination, found anemic conjunctiva, jaundice (-), pupil reflex +/- 3 mm/3 mm, no enlarged lymph nodes, normal jugular venous pressure, regular heart sounds, murmur (-), vesicular lung sounds, wheezing (-), on examination of the abdomen visible open surgical wound 4cmx3cmx3cm. Pus (+) at the end of the surgical wound, visible redness at the edges of the surgical wound. There were no signs of an acute abdomen.

From the laboratory test results, hemoglobin 8.3, leukocytes 57,500, platelets 327,000, hematocrit 24, and albumin 2,4. Then the patient has diagnosed with post-operation wound infections at P2A0H2 post-cesarean section + moderate anemia + malnutrition. The plan for this patient is to improve his general condition, given IVFD RL 20 gtt, ceftriaxone injection, 2 units of PRC transfusion, pus culture, and GV 2 times per day. After the general condition improves, the plan is to carry out secondary hecting.

The patient also had a history of pulmonary hypertension and secundum atrial septal defect. The

patient was referred to the heart and vascular department. Echocardiographic examination showed secundum ASD 14 - 20 mmL to R, mild ec functional MR, mild TR, low probability PH, good global systolic function, EF 62% (Simpson), global normokinetics with paradoxical IVS, LVH concentric remodeling with LV diastolic function cannot be assessed ec fusion (tachycardia), RV contractility is good, minimal pericardial effusion around the heart chambers. The thoracic X-ray examination showed 60% CXR, embedded apex, normal aortic segment, no cranialization, and infiltrate (+) from the results of the heart examination. The advice is to overcome the infection and apply the sepsis bundle treatment.

On the 5th day of treatment, the patient complained of fever, and weakness, accompanied by shortness of breath, then a physical examination was carried out and found the general condition of the patient was weak, compost mentis awareness, blood pressure 70/40 mmHG (MAP 50), breathing 28 beats per minute, pulse 124 beats per minute, temperature 39 degrees celsius with oxygen saturation 90-91% with a 5 L/i nasal cannula, qSOFA score 2. then the patient is consulted with the internal medicine department. Then the patient was enforced with a diagnosis of septic shock ec post-operation wound infection on P2A0H2 post-cesarean section + moderate anemia + malnutrition, resuscitate with RL 500 cc, oxygen 10 liters/minute with NRM, drip vascon according to target weight MAP > 65 mmHg, Inj ampicillin sulbactam 3x3 g IV runs out in 4 hours, Inj amikacin 1x1 gr. Then a laboratory examination was carried out. After being resuscitated, the patient was observed for periodic vital signs every 15 minutes, and then the patient was advised to move to the ICU.

While in the ICU, examination of vital signs found the patient was weak, compost mentis conscious, blood pressure 80/55 mmHG (MAP 63), Respiration 28 times per minute, pulse 114 times per minute, temperature 38.6 degrees Celsius with 98% oxygen saturation with NRM 10 L/ and laboratory examinations obtained hemoglobin 8.6, leukocytes 14.870, platelets 236,000, hematocrit 24, albumin

2.4, Procalcitonin > 100. The patient received IVFD therapy NaCL 0.9%, ceftriaxone 2x1 gr, levofloxacin 1x750 mg, metronidazole 3x500mg, drip norepinephrine 8 cc/hour. Furthermore, therapy was continued until the 5th day of treatment. On the 5th day of treatment in the ICU, the patient's condition had improved, a vital sign examination was carried out, the patient was weak, compost mentis awareness, blood pressure 100/74 mmHG (MAP 76), breathing 24 times per minute, pulse 97 beats per minute, temperature 36.7 degrees celsius with 98% oxygen saturation with a 7 L/i nasal cannula and laboratory tests were carried out and the results of hemoglobin 12.3, leukocytes 17,140, platelets 303,000, hematocrit 36, albumin 2.4, ureum 28, creatinine 0.4, Procalcitonin >100. Then a secondary hecting procedure was performed on this patient. After surgery, the patient was admitted to the obstetrics HCU.

3. Discussion

This study reported that a 28-year-old woman came to comprehensive emergency neonatal obstetrics Dr. M. Djamil General Hospital Padang with complaints of pus discharge and reddish swelling in the scar after a cesarean section operation. Hemodynamics at ICU admission with blood pressure 80/55 mmHG (MAP 63), with vasopressor titration 0.25 mcg/kgbb/hour. Surviving sepsis campaign: International guidelines for the management of sepsis and septic shock 2021 recommends that in patients with septic shock who receive vasopressors such as norepinephrine, the initial target mean arterial pressure (MAP) should be above 65 mmHg. MAP is a crucial marker of mean systemic filling pressure, the main drain of cardiac output and venous return. An increase in MAP will cause an increase in blood flow and improve tissue perfusion. Although some tissues can self-regulate their blood flow, such as the brain and kidneys, MAP below the threshold of 60 mmHg will lead to decreased organ perfusion.¹⁰

On admission to the ICU, the patient received crystalloid fluid resuscitation per the guidelines. For

sepsis or septic shock patients, crystalloids are recommended for initial resuscitation fluid administration. For patients with hypoperfusion-induced sepsis or septic shock, it is recommended that at least 30 mL/kg of IV crystalloid fluid should be administered within the first 3 hours of resuscitation.^{10,11}

The pathophysiology of sepsis is the occurrence of vasodilation, capillary leakage, and inadequate blood volume supply, which will reduce venous return. That causes hemodynamic disturbances, namely impaired tissue perfusion and organ dysfunction. The goal of sepsis and septic shock resuscitation is to restore intravascular volume, improve oxygen delivery to tissues, and prevent organ dysfunction.¹²

In administering vasopressors, norepinephrine is the first-line agent over other vasopressors. Norepinephrine has a vascularizing effect because norepinephrine is a potent α -1 and β -1 adrenergic receptor agonist. Norepinephrine will be increased MAP but has minimal effect on heart rate.¹⁰ Patients with a history of pulmonary hypertension and Atrial Septal defects. Most adult ASDs develop PH, which causes significant morbidity and mortality. If undiagnosed, therefore uncorrected, ASD can progress to pulmonary hypertension (PH). In this patient, ASD has also progressed to pulmonary hypertension.¹³

Patients with septic shock and cardiac dysfunction, with persistent hypoperfusion despite adequate arterial blood volume and pressure status. The sepsis guideline suggests "to add dobutamine to norepinephrine or use epinephrine alone."¹⁴ The patient immediately received antibiotic therapy, ceftriaxone 2x1 gr, levofloxacin 1x750 mg, and metronidazole 3x500mg, without waiting for culture results. Before administering the first dose of the antimicrobial drug, blood and urine samples for culture were taken. Management will be delayed if we wait for culture results to administer antimicrobials. If proper antibiotic administration is delayed, it is associated with increased patient mortality.^{4,12}

The initial antimicrobial drug should be a broad-spectrum drug that covers all possible bacteria. A

multidrug regimen may be given to ensure all possible pathogens are covered.¹² Patients with severe malnutrition. In patients with congenital heart disease with malnutrition, malnutrition is thought to be related to decreased intake and increased metabolism.¹⁵

From the results of the labor examination, the procalcitonin value was >100. Sepsis guideline recommended for adults with suspected sepsis or septic shock “suggest against using procalcitonin plus clinical evaluation to decide when to start antimicrobials, compared to clinical evaluation alone”.¹⁰

Procalcitonin is a response mechanism to pro-inflammatory stimuli, especially bacterial infections. In theory, procalcitonin levels evaluated with an excellent clinical examination can facilitate the diagnosis of serious bacterial infections so that management can be provided quickly and appropriately, especially early initiation of antimicrobials.¹⁰ The patient was given an albumin transfusion because the labor test results obtained albumin 2.4. Albumin administration will increase plasma colloid osmotic pressure and increase fluid volume, thus providing a hemodynamic stability effect. The sepsis survival campaign guidelines recommend that "septic patients with profuse crystalloid input use albumin during initial resuscitation." In sepsis patients, serum albumin production and metabolism are severely impaired. Massive fluid resuscitation and overload will lead to fluid retention and edema formation and are exacerbated by hypoalbuminemia. However, increasing evidence suggests that the effect of albumin treatment may be heterogeneous in patients with sepsis, especially patients with organic heart disease.¹⁰

In this patient, the source of infection was identified as a surgical wound that infected, so the critical management in managing this patient was to remove all sources of infection. Despite appropriate resuscitative measures, inadequate source control may worsen organ function and hemodynamic instability.¹⁰ The subsequent management in this

patient was surgical debridement and seconder heating of the surgical wound. After the source of the infection was resolved, adequate antibiotics were given. The patient was discharged from the ICU in good condition.

4. Conclusion

This study reported that septic shock is a life-threatening condition, especially in patients with congenital heart disease. Appropriate, rapid, and comprehensive treatment and addressing the source of infection are essential in managing sepsis shock.

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