

## Case Report

# Perioperative Management on Septic Condition et Causa General Peritonitis: Case Report

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## ABSTRACT

Sepsis is a life-threatening systemic pathological condition. Based on WHO, there were 48.9 million cases with 11 million related deaths worldwide in 2017, which is almost 20% of all deaths from disease. Nearly half of all sepsis cases globally occurred in children, with an estimated 20 million cases and 2.9 million deaths. One of the conditions that can cause sepsis is generalized peritonitis. This study is a case report. Primary data was obtained through anamnesis, physical examination, laboratory test and radiology examination. In this case report, a 13-year-old child patient with generalized peritonitis was found due to obstructive ileus causing intestinal perforation, accompanied by sepsis, and underwent laparotomy and colostomy. Appropriate perioperative management is necessary to maintain hemodynamic stability and adequate oxygenation given the presence of sepsis in the patient.

**Keywords** : peritonitis, perioperative, sepsis, shock septic

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## INTRODUCTION

Sepsis is a systemic pathological condition characterized by the presence of two of the four criteria for Systemic Inflammatory Response Syndrome (SIRS), namely, body temperature  $>38^{\circ}\text{C}$  or  $<35^{\circ}\text{C}$ ; pulse frequency  $>90$  times per minute; respiratory frequency  $>20$  times per minute; and white blood cell count  $>12,000\text{ mm}^3$  or  $<4,000\text{ mm}^3$  or found  $>10\%$  immature white blood cell count; which is accompanied by a clear focus of infection (Hotchkiss et al., 2016). In 2017, 48.9 million cases and 11 million sepsis-related deaths were recorded worldwide, accounting for nearly 20% of all global deaths. In 2017, almost half of all global sepsis cases occurred in children, with an estimated 20

million cases and 2.9 million global deaths in children under five years of age (Rudd et al., 2020).

Based on WHO data, around 85.0% of sepsis cases and sepsis-related deaths worldwide occur in low-income and developing countries such as Indonesia (WHO, 2020). One condition that can cause sepsis is generalized peritonitis. Peritonitis is inflammation of the peritoneum, which is a thin membrane that lines the inner walls of the stomach and the organs in the stomach, which is often caused by bacterial infections (Brown D, 2022). If there is a focus of infection in the peritoneum area which is large in size and covers almost all the organs in the stomach, then the infection will very easily spread to other organs through the blood circulation (Brown D, 2022).

Several studies state that the etiology of peritonitis varies based on geographic location and local environmental factors with genetic predisposition (Kumar et al., 2021). Appendicitis and perforation of the ileum or cecum are the most common causes of peritonitis with an estimated prevalence of around 43.1% and 35.1% respectively (Purwanto & Astrawinata, 2018). Some other causes of peritonitis include gastroduodenal perforation, ruptured abscess, perforated peptic ulcer, and trauma (Chen et al., 2023; Ross et al., 2018). The aim of this case report is to present and discuss perioperative anesthetic management, morbidity and mortality in patients with sepsis and septic shock due to generalized peritonitis.

## **CASE REPORT**

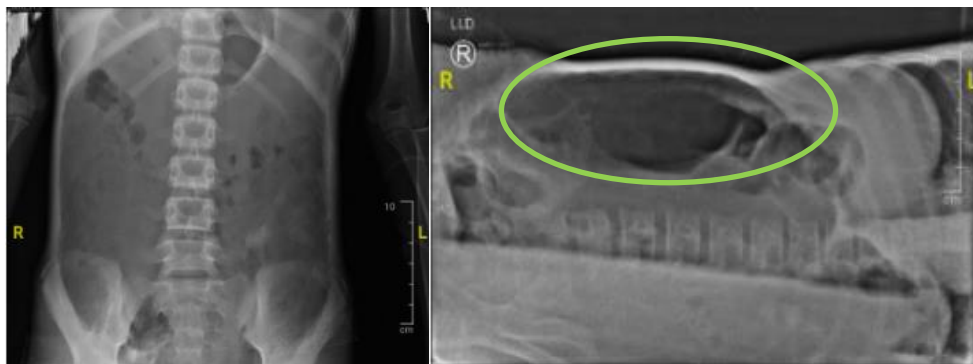
A 13 year old girl, 33 kg, complained of severe abdominal pain for 2 months. Abdominal pain seems to come and go and get worse in the last 1 month. The patient feels that his stomach is getting bigger, feels stiff, and becomes more painful when pressed. The patient also complained of difficulty defecating in the last 2 weeks, and his body became thinner, and the patient admitted to having a fever that came and went. The patient has never experienced a similar disease before, the patient has no history of other related diseases such as stomach acid, gastrointestinal inflammation, or appendicitis; and has no history of other systemic diseases such as high blood pressure, asthma and blood sugar disease.

The results of the physical examination before surgery (pre-operation) showed that the patient's general condition was adequate, with composmentis consciousness (GCS E4V5M6), blood pressure 90/65 mmHg, pulse rate 125 x/minute, respiratory rate 24 x/minute, oxygen saturation (SpO<sub>2</sub>) 98 % NRBM 15 LPM, the patient has a h fever with a body temperature of 38.1 oC, round pupil isochore 3mm/3mm, and light reflex +/+, and there is an NGT tube installed in the patient's right nostril. The NGT production is between 800-1500 cc/24 hours yellowish green with minimal bowel sounds. On physical examination of the lungs and heart, no abnormalities were found. However, on physical

examination of the abdomen, the abdomen was distended, bowel sounds were (+), and there was pain and muscular deflation when pressure was applied.

Evaluation of the airway using the 'LEMON' examination on the patient to determine the level of difficulty during intubation found large incisors in a forward position; the patient can open the mouth and insert 2 fingers into it, the distance between the chin and the patient's hyoid bone is 3 fingers long, the distance between the thyroid bone and the floor of the mouth is 2 fingers long; Malampati score 2; no airway obstruction was found; and there is no resistance in moving the neck.

Preoperative supporting examinations carried out included a complete blood count with Hb 12.0 g/dL; leukocytes  $16.4 \times 10^3/\mu\text{L}$ ; hematocrit 38.0 %; platelets  $296 \times 10^3/\mu\text{L}$ ; and albumin 3.3 g/dl. The results of AP and LLD plain abdominal radiographs showed an elongated air fluid level and pneumoperitonium (Figure 1). The patient was diagnosed with generalized peritonitis et causa perforation of the cecum, and a laparotomy and colostomy were planned.



**Figure 1.** Preoperative abdominal anteroposterior (AP) photo and left lateral decubitus (LLD) abdominal photos. In the LLD photo there is a picture of free air (in the green circle). The presence of free air on LLD photographs and clinical examination supports the diagnosis of peritonitis.

The patient is classified as ASA category 4 because he is a pediatric patient with sepsis. Patients fasted for 6 hours before surgery. The patient was positioned supine and preoxygenated for 5 minutes with 100% O<sub>2</sub>. Induction of patient anesthesia was carried out by administering a combination of propofol 30 mg IV, midazolam 2 mg IV, fentanyl 250 mcg IV, and atracurium 15 mg IV. Maintenance of anesthesia by administering sevoflurane (MAC 2%) ratio of 1 lpm oxygen: 1 lpm air. The operation lasted 120 minutes. The patient received 1000 mL of Ringer Fundin crystalloid fluid intake, 500 mL of gelafusal, and 100 mL of paracetamol. Fluid output during surgery was 200 mL of bleeding and 6000 mL of perforation fluid. Postoperative evaluation was carried out for 3 days, and the patient died on the 3rd day after laparotomy surgery with vital signs that suggested septic shock.

## **DISCUSSION**

Analysis of the criteria for sepsis in patients showed that the patient was suspected of having sepsis from before the operation until the patient died 3 days after surgery due to septic shock. Where according to the SIRS criteria, the patient has met 4 criteria, namely respiratory frequency 24 times per minute, pulse frequency 125 times per minute, body temperature 38.1°C, and white blood cell laboratory results of  $16.1 \times 10^9$ , which is accompanied by a focus of infection in the peritoneal organs. Likewise, during the 3 days of post-operative evaluation, the patient's vital signs showed the same picture in accordance with the SIRS criteria, with laboratory results of white blood cells increasing with a final value of  $20.1 \times 10^9$ . On the evaluation on the third day after surgery, the patient was declared dead after undergoing treatment in the pediatric inpatient room.

The results of the analysis using the qSOFA score during the 3 days of post-operative evaluation, on the first day it was found that the RR was 28 times/minute, GCS was less than 15 where the patient experienced apathy, and a decrease in BP of up to 90 mmHg so that the score obtained was more than 2. On the second day of evaluation RR was found to be 30 times/minute, GCS was less than 15 where the patient experienced apathy, and a decrease in BP to 89 mmHg so that the score obtained was more than 2. Furthermore, on the third day of evaluation it was found that RR was 35 times/minute, GCS was less than 15 where the patient experienced delirium, and a decrease in BP of up to 80 mmHg so that the score obtained is more than 2, as well as a decrease in oxygen saturation of up to 80% using NRBM 13 LPM. Based on this analysis, the patient has an infection that needs to be treated aggressively.

Next, analysis was carried out using the SOFA score on the patient. The respiration ratio data (PaO<sub>2</sub>/FiO<sub>2</sub>) could not be determined because the BGA examination was not carried out, the bilirubin liver function examination was not carried out, in the renal function examination the serum creatinine level was within normal limits, in the coagulation examination the platelet level was within normal limits, the patient's last GCS score was obtained 9, and the patient's last Mean Arterial Pressure (MAP) value was 62 mmHG, so the patient's total SOFA score from the latest available data was 5, which indicates that the patient has experienced organ dysfunction due to sepsis and is leading to septic shock.

Preoxygenation in patients aims to denitrogenize and prolong the duration of apnea time. In normal people, oxygen requirements are around 200-250 ml/min. Normal Functional Residual Capacity / FRC (ERV + RV) is around 30-35 ml/KgBB. The patient's weight is 33 kg, so based on the patient's FRC, the patient has an apnea duration of between 5 and 6 minutes. In these patients, the tidal volume is also maintained low, namely around 4-6 ml/KgBW to maintain PaCO<sub>2</sub>. The intravenous agents used in patients were propofol, midazolam, fentanyl, and atracurium. Midazolam was given to the patient to provide additional anti-anxiety and retrograde amnesia effects considering that the patient was a

pediatric patient and was in a condition of sepsis. Apart from that, the inhalation agent used for maintenance is sevoflurane because it has minimal effect on hemodynamics (Butterworth et al., 2022).

Morbidity and mortality rates related to sepsis and septic shock in Indonesia are still quite high from year to year, especially in pediatric patients. Based on the 2013 Riskesdas data published by the Ministry of Health, the main infectious diseases in Indonesia that have the potential to cause sepsis include ARI, pneumonia, tuberculosis, hepatitis, diarrhea, peritoneal infections and malaria, where these conditions can lead to septic shock and are the cause of death. in Indonesia (Riskesdas, 2013). According to the Surviving Sepsis Campaign (SSC), initial management of septic shock is measuring lactate levels caused by tissue hypoxia and hypoperfusion and carrying out blood cultures. Next, resuscitation with crystalloid fluids of 10-20ml/KgBW and broad spectrum antibiotics is carried out, followed by administration of vasopressors until the MAP is >65 mmHg (Brown & Semler, 2019; Evans et al., 2021; Farrell & Casserly, 2018; Gyawali et al., 2019; Kamath et al., 2023; Rudd et al., 2020).

This patient did not undergo blood culture, BGA and lactic acid examination because the time estimate could not be done quickly. Treatment was carried out on patients by administering Inf D5 ½ NS 1000 cc/24 hours, Aminofusin 500 cc/24 hours, broad spectrum antibiotics and administering vasopressor agents. Infection that has spread hematogenously causes an increase in white blood cells and an inflammatory response whose function is to eliminate the threat of infection in the interstitial tissue by releasing several molecules such as nitrous oxide (NO). Increasing NO levels causes massive vasodilation which has an impact on reducing Systemic Vascular Resistance (SVR). This dilation of blood vessels causes blood cells in the blood vessels to move more freely and move slowly in the area of infection (Lambden, 2019; Webber et al., 2019; Winkler et al., 2017).

Infection spreads through peripheral blood vessels causing all blood vessels to experience vasodilation and a decrease in SVR which can cause a decrease in BP resulting in hypotension (Mahapatra S, 2022). To maintain MAP, it is necessary to administer a vasopressor, for which this patient was given epinephrine. The administration of epinephrine as a vasopressor is aimed at meeting the initial MAP target of >65 mmHg, resulting in increased perfusion to organs (Dewitte et al., 2021; G. T. Lee et al., 2019; S. H. Lee et al., 2021; Leone et al., 2015; Sarkar et al., 2022; Yoshimoto et al., 2022).

## **CONCLUSION**

Septic shock and sepsis are cases that often cause death, especially in pediatric patients. A quick and precise assessment is needed to detect sepsis through several assessment criteria such as using SIRS, qSOFA, and SOFA score. In addition, appropriate

perioperative management and treatment is needed so as to reduce the risk of adverse conditions in the patient and maintain hemodynamic stability and patient oxygenation.

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