• pISSN: 2085-1545
• eISSN: 2339-093X

Sains Medika Journal of Medicine and Health

http://jurnal.unissula.ac.id/index.php/sainsmedika

CASE REPORT

Obesity as a Risk Factor for Surgical Site Infection After Transperitoneal Cesarean Section

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ABSTRACT

Surgical site infection (SSI) is one of the main complications that can increase morbidity and mortality in obese women after cesarean section. Surgical site infection can be caused by endogenous or exogenous factors. This was a case of a woman, G4P3A0, 32 years, after trans-peritoneal cesarean section for indications of breech presentation; primary uterine inertia; premature rupture + 22 hours with BMI = 30.80 kg/m2. This case report discusses how obesity causes surgical site infection and its management.

Keywords: *Obesity, surgical site infection*

INTRODUCTION

Surgical site infection is an infection that often causes morbidity and mortality in nearly 25% of patients with abdominal surgery including cesarean section (Maggio et al., 2015) Surgical site infection (SSI) after cesarean section, a nosocomial infection, is common in the obstetrics and gynecology department (Owens et al., 2009) At present, the percentage of live cesarean deliveries in developing countries is higher than 20%, exceeding the rate set by WHO (15%) (Lamont et al., 2011). The number of cesarean delivery continues to increase in various countries, including in Indonesia, with a rate of 6% (Mien K. Mahmud and Zulfianto, 2009). The increase in the number of deliveries by cesarean section is directly proportional to the incidence of postoperative SSI. Women undergoing cesarean section are at risk to get an infection and their infection morbidity is five to 20 times greater than that of normal delivery (Smaill and Grivell, 2014) Moreover, obesity is significantly associated with the incidence of SSI after cesarean section in both superficial and deep incisions (Wloch et al., 2012)

LITERATURE REVIEW

The surgical site infection is defined as an infection occurring within 30 days after surgery without implant placement or within a period of 1 year if the implant suspected to be related to surgical procedures (Reichman and Greenberg, 2009) The most common characteristics of SSI in women after cesarean section were purulent discharge (83.3%), local pain (73.3%), redness (68.3%), bruising (63.3%), and swelling (40 %). The highest prevalence of SSI after cesarean section is in the superficial incision accounting for 73.3%, followed by deep incision accounting for 26.7% (de Araújo Madeira et al., 2014). The prevalence of post-cesarean section is higher both in the superficial incision and in the incision in obese women.

Obesity can cause serious SSI complications in women after section cesarean section (Novelia, Sia and Songwathana, 2017) Research conducted by Devjani in 2013 stated that risk factors that showed a significant relationship with SSI, including age, emergency measures, body mass index of more than 25, prolonged hospital stay before surgery, length of surgery and hospital stay, vertical skin incision, premature or prolonged rupture of membranes (more than 24 hours), inappropriate timing of prophylactic antibiotics, and previous illness (De et al., 2013).

The majority of SSI is caused by microorganisms originating from patients such as skin, mucous membranes, and inner body cavities. The most common microorganisms causing SSI is Staphylococcus spp, with an increase in resistant strains, such as methicillin-resistant S.aureus (MRSA). In the inner cavity around the tissue or organ involved are exposed to Gram-negative bacteria such as Acinetobacter spp, Escherichia coli, Gram-positive bacteria such as Enterococcus, and

sometimes anaerobic bacteria such as Bacillus fragilis. In addition, fungal and pathogenic species can also pose a risk of contamination (Reichman and Greenberg, 2009).

The procedure for cesarean section is said to be "clean-contaminated" if the procedure is performed without an amniotic membrane rupture and /or other signs of labor. Otherwise, it is referred to as a "contaminated" procedure if it is done in an emergency accompanied by signs of labor and/or rupture of the amniotic membrane (Wloch et al., 2012). The American College of Obstetricians and Gynecologists (ACOG) recommends prophylactic antibiotics in women undergoing a cesarean section, a single dose of cefazolin given intravenously 60 minutes before skin incision. For women with BMI >30 Kg/m2 or weight > 100 Kg, the dose of cefazolin can be increased to 2 grams. If the surgical procedure is more than 3 hours or the estimated blood loss is greater than 1500 ml, prophylactic antibiotics must be given after 3-4 hours of initial antibiotic prophylaxis (The American College of Obstetricians and Ginecologists, 2011). The study of Pevzner et al., showed that prophylactic antibiotics reduce SSI incidence. Effective prophylactic antibiotics must include three basic principles: the spectrum of antibiotics chosen must be able to kill the contaminating germs in the surgical site, antibiotics must be given in a timely manner, and its concentrations can last long in the tissue during surgery (Pevzner et al., 2011). Various data show that the administration of prophylactic antibiotics 0 - 60 minutes before incision has been proven to reduce the risk of surgical wound complications. Pevzner et al. reported that the administration of 1 gram of cefazolin in obese patients resulted in SSI of 16.5%, whereas the administration of cefazolin at a dose of 2 grams resulted in 5.6% SSI. This illustrates that the administration of one. (Pevzner et al., 2011).

CASE

A woman, 32 years old, G4P3A0 presented with complaints of water coming out of the birth canal (premature rupture). Based on physical examination, there were normal vital signs with height: 1.55 m; Body weight = 74 Kg, the Body Mass Index = (BW/[H]2) = (74/2.4025) = 30.80 kg/m2. The results of the abdominal examination showed auterus fundus Height of 31 cm, the estimated fetal weight of 2800 grams; HIS: rarely positive, fetal heart rate (FHR) 130 x /min; Leopold I - III: intra uterine fetus, breech position, right back. From the vaginal examination toucher showed an opening of 3 cm, Amniotic Skin (-), eff. 50%, bottom of the leg buttocks, Hodge 1; Sacrum is difficult to assess PPV: amniotic water (+). The routine blood test showed leukocytosis (14,300/µL). The blood glucose examination was 82 mg/dL. The obstetric department diagnosed this patient was with G4P3A0, 32 years, 9 months pregnant; one live intrauterine fetus; breech presentation, right back; on first phase labor; primary uterine inertia; early rupture of membranes + 22 hours and obesity. Based on this indication, the transperitoneal caesarian section was conducted. Prophylactic antibiotics in these patients were injections of cefazolin 2 grams (IV) given 30 minutes before incision. Operating time 2 hours 30 minutes. The amount of bleeding is 4500 cc. The general post-operative condition of the patient was compos mentis, with pulse vitality: 80 x/min, blood pressure: 120/70 mmHg, body temperature: 37^0C; uterus: 2 fingers below the navel, strong contractions; born baby weigh 3000 grams; chest circumference: 32 cm; Apgar score: 9-10-10. Patients were not given prophylactic antibiotics after 3-4 hours of initial prophylactic antibiotics because even though the amount of bleeding is more than 1500 cc. The fourth day after SCTP, obtained pus from the former stitches, wound dehiscence (+). Post-SCTP patients receive ceftriaxone injection 2 grams/24 hours (i.v) for 14 days and infusion of metronidazole 500 mg/8 hours (i.v) for 13 days. From the results of the basic wound swab culture, Pseudomonas aeruginosa is only sensitive to amikacin and sulbactam cefoperazone. From the results of the culture, the patient received sulbactam cefoperazone 1 gram/24 hour antibiotic (i.v) for 6 days. To clean wounds and tissues, re-stitching was carried out, the operating time was 1 hour 25 minutes, and the results of identification of the visible wound were musculus rectus abdominis as the basis of the wound, then the drain was installed. The first day of drainage found serous liquid ±20 cc/24 hours, then the next day there was no serous or pus fluid, so the drainage was removed, and the patient was allowed to go home. The total length of treatment in these patients was 33 days (Figures 1 - 5).

DISCUSSION

The diagnosis of SSI in this patients was based on physical examination, as well as microbiology laboratory examination. The physical examination indicated the presence of pus and surgical site infection regarding the fascia and muscle layer, with the results of the wound swab culture showing Pseudomonas aeruginosa. The surgical site infection in this patient appeared after 4 days after transperitoneal caesarian section. The total length of stay was 33 days. According to the classification of the surgical site infection set by

Figure 1. Follow up day 4 after cesarean section: wound dehiscence on surgical wound

Figure 2. Follow up day 23 after re- stitching

Figure 3. Follow up day 26 after drainage

Figure 4. Follow up day 27 after drainage: 20 cc/24 hour serous liquid

Figure 5. Follow up day 31 after drainage removal

Centers for Disease Control and Prevention, this patient had a deep incision infection because the musculus rectus abdominis was the basis of the wound.

The prevalence of overweight and obesity has been increasing worldwide, including in pregnant women. Obese women are susceptible to infection because it will affect the immune system, skin barrier, wound healing, mobility, and the presence of chronic diseases that can increase the risk of infection (Leth et al., 2011). Considering this patient has a body mass index (BMI) of 30.80 kg/m2, and according to WHO obesity is an intrinsic risk factor, postoperative SSI in these patients was easier. Furthermore, a BMI of 30.80 kg/m2 according to WHO is included in class I obesity, with a high risk of death and morbidity. Various complication data from obstetrics and gynecology such as surgical site infection, venous thromboembolism, and wound complications are more common in women with obesity than women with normal weight higher BMI increases the risk for surgical site infections (Wloch et al., 2012).

Body mass index of more than 25, has been shown to affect the results of surgery mediated by various local changes. Local changes such as decreased perfusion in adipose tissue and increased local tissue trauma associated with retraction contributed to an increased incidence of surgical site infections in patients. A study conducted by Wloch et al showed that women with high BMI were significantly associated with the incidence of SSI after cesarean section, both for superficial and deep incisions compared to women with normal BMI (18.5-25 kg/m2) (Wloch et al., 2012). Other data showed that compared to women with normal weight, women with overweight (BMI 25-30) were found to have 1.6 (95% CI 1.2-2.2) times higher risk and obese women (BMI> 30) had 2.4 times higher risk to develop SSI (95% CI 1.7-3.4) (Leth et al., 2011; Wloch et al., 2012). This might have been due to hypoperfusion and ischemia in subcutaneous adipose tissue, imbalances in body homeostasis and decreased immune function so that it can complicate wound healing in obese pasients (Guo and DiPietro, 2010; Tipton, Cohen and Chelmow, 2011; Thelwall et al., 2015) Excessive adipose tissue in obese patients will increase the need for tissue circulation; which is not followed by the number of capillary blood vessels resulting in vascular insufficiency that inhibit wound healing, so that there is a decrease in effective oxygen diffusion from the capillaries to the surrounding tissue. In addition, due to increased hydrostatic pressure, there can also be a leakage of intravascular components to the surrounding tissue, triggering an inflammatory response. Protein material accumulates in the interstitium around the capillaries causing clotting and eventually fibrosis. This factor will be a barrier so that oxygen and nutrients cannot supply the tissue (Pierpont et al., 2014). Obesity will also trigger a chronic inflammatory process, TNF-α will cause $\gamma\delta$ T cells to become unresponsive to epithelial damage, prevent the release of cytokines and growth factors that facilitate wound healing. Adipose tissue hypoperfusion in obese patients is also a predisposing factor for the occurrence of SSI because in conditions of hypoxia the leukocytes can phagocytize the bacteria but cannot lyse it (Guo and DiPietro, 2010; Pierpont et al., 2014).

The result of swab culture from the wound base in the patient with surgical site infection was Pseudomonas aeruginosa, a gram-negative belonging to phylum proteobacteria classified as an opportunistic pathogen commonly found in water and soil including

in hospital environments. In addition, Pseudomonas aeruginosa has the ability to form biofilms, produce several virulence factors such as exotoxins, proteases, phospholipases which will complicate wound healing. One of its virulence factors is being able to produce pyocyanin blue pigments. Pyocyanins have several toxic effects on host cells, including depletion of NADH, gluthathione and other antioxidants in host cells, changes in redox status, and radical oxygen formation. As a result of the formation of the biofilm, it is very difficult for the wound to be able to eliminate these germs only by the administration of antibiotics, therefore it is necessary to debridement to eliminate the source of infection (Person, 2010). After debridement in this case also carried out drain installation to control the source of infection around the wound. Seroma, hematoma, exudate, and purulent fluid, necrotic tissue will slow wound healing and increase the risk of surgical site infection. If there is seroma, it can be evacuated with needle aspiration, but if there is necrotic tissue, or purulent fluid, seroma, hematoma, and exudate, wound exploration or debridement should be performed in the operating room (Kawakita and Landy, 2017).

CONCLUSION

Several factors can cause obese patients after cesarean section to be susceptible to surgical site infections, including a decrease in oxygen diffusion in the subcutaneous adipose tissue, an imbalance in the inflammatory response, the inability of leukocytes to kill germs so that it will interfere with the wound healing process. To prevent the development of infection after cesarean section, it is very important to identify early risk factors for obesity in pregnant women. Effective measures for the management of surgical site infections are intended to control the source of infection, namely debridement and administration of antibiotics according to culture results.

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