Case Report: Recurrent Surgical Wound Dehiscence in a Patient with Surgical Site Infection, Type 2 Diabetes, and Obesity

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Abstract
Introduction: Surgical Site Infection (SSI) is the most likely complication following a Cesarean Section (CS). SSI is considered a contributing factor to the occurrence of Surgical Wound Dehiscence (SWD). This condition is often associated with various risk factors, such as Type 2 Diabetes Mellitus (T2DM) and obesity. Understanding the risk factors and management of SWD in high-risk populations is essential for improving clinical outcomes.
Case Report: A 27-year-old woman, G2P2A0, was referred due to SWD. The patient underwent a CS at a secondary-level hospital due to oxytocin drip failure 20 days prior to referral. She was diagnosed with SSI six days post-surgery, and had received antibiotics and undergone re-hecting 11 days after the CS. The surgical wound reopened two days after the re-hecting procedure, prompting referral. The patient had uncontrolled T2DM and morbid obesity as comorbidities. Physical examination revealed an open CS wound measuring 15x5x3 cm with exposed fascia and discharge of pus and blood. Wound care was performed using gauze coated with antibiotics changed every 12 hours. Antibiotic administration was based on culture, sensitivity, and resistance testing before another re-hecting procedure was performed.
Conclusion: Obesity and diabetes mellitus were risk factors for SWD in this case. The use of antibiotics guided by culture sensitivity and resistance testing, effective SSI management, and early detection and management of comorbid conditions are necessary to prevent and treat SWD complications.

Keywords: Recurrence, surgical site infection, surgical wound dehiscence, type 2 diabetes mellitus

Laporan Kasus: *Recurrent Surgical Wound Dehiscence* pada Pasien Infeksi Daerah Operasi yang Memiliki Komorbid Diabetes Tipe 2 dan Obesitas

Abstrak
Pendahuluan: Infeksi Daerah Operasi (IDO) merupakan komplikasi yang paling mungkin terjadi setelah operasi Caesar (SC). IDO dianggap sebagai faktor terjadinya *Surgical Wound Dehiscence* (SWD). Kondisi ini sering dikaitkan dengan berbagai faktor risiko seperti diabetes melitus tipe 2 (DMT2) dan obesitas. Pemahaman mengenai faktor risiko dan penanganan SWD pada populasi berisiko tinggi menjadi penting untuk meningkatkan luaran klinis.
Laporan Kasus: Wanita 27 tahun, P2A0, dirujuk karena SWD. Pasien menjalani SC di RS PPK tingkat II karena gagal drip oksitosin 20 hari sebelum dirujuk. Pasien didiagnosis IDO 6 hari setelah operasi dan telah mendapatkan antibiotik dan dilakukan re-hecting 11 hari setelah SC. Luka operasi terbuka kembali dua hari setelah re-hecting, sehingga pasien dirujuk. Pasien memiliki komorbid DMT2 tidak terkontrol dan obesitas morbid. Pemeriksaan fisik menunjukkan tampak luka bekas SC terbuka berukuran 15x5x3 cm dengan dasar fasia dengan nanah dan darah. Perawatan luka dilakukan dengan kasa dilapisi antibiotik dan diganti setiap 12 jam. Antibiotik diberikan berdasarkan hasil tes kultur, sensitivitas, dan resistensi, se\belum dilakukan re-hecting kembali.
Kesimpulan: Obesitas dan diabetes melitus menjadi faktor risiko terjadinya SWD pada kasus ini. Penggunaan antibiotik sesuai hasil kultur sensitivitas dan resistensi, perawatan IDO, serta deteksi dan manajemen faktor komorbid diperlukan untuk mencegah dan mengobati komplikasi SWD.

Kata kunci: Diabetes mellitus tipe 2, infeksi daerah operasi, luka operasi terbuka, rekurensi

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Introduction

Surgical site infection (SSI) represents a prevalent complication following caesarean sections, with an incidence ranging from 3% to 15%.[1] In Indonesia, the exact prevalence of SSI is unknown due to limited data. At Hasan Sadikin Hospital, Bandung, which is a tertiary referral hospital, the incidence of SSI following SC in 2021 was 3.39% and 3.19% in 2022, exceeding the national standard set at 2%.[2] SSI is frequently viewed as a precursor to the development of Surgical Wound Dehiscence (SWD).[3] Wound dehiscence (WD) represents a significant post-operative complication characterised by the partial or complete failure of abdominal wound closure, which may occur with or without the protrusion of abdominal contents.[4] The rates of incidence and mortality differ across various centres; reports indicate that the mortality rate for severe postoperative complications is approximately 45%.[5] The rate of Surgical Wound Dehiscence (SWD) following a caesarean section ranges from approximately 1.9% to 7.6%, with figures potentially reaching 12% among obese women.[6] SWD may lead to a reduction in the quality of life for patients, an extended duration of hospital stays, and a financial strain on both patients and the healthcare system.[7]

Risk factors for SSI can be categorized as modifiable (e.g., Staphylococcus aureus colonization and body weight) and non-modifiable (e.g., age and gender).[1] Risk factors can be divided into host and perioperative factors, which can be further divided into preoperative, intraoperative, and postoperative. Host optimization has been shown to reduce the risk of infection and should be initiated early. Preoperative optimization can include controlling glucose and ulcers in diabetes patients, controlling foci of infection, improving the immune system, and treating malnutrition and obesity. Other trategies include optimizing skin condition, improving vascular status, smoking cessation, modifying immunosuppressive drug intake, and decolonization of Staphylococcus aureus.[8]

Following treatment, there is a possibility that wound dehiscence may reoccur or become open again. The recurrence of wound dehiscence may arise from several factors, such as inadequate wound healing, the presence of infection, obesity, malnutrition, chronic illnesses, or other underlying health issues.[9] At present, the existing literature specifically addresses. The occurrence of wound dehiscence is relatively infrequent, and currently, there are no established management guidelines addressing the recurrence of surgical wound dehiscence. This case report outlines the procedures for addressing the recurrence of WD in patients who present with multiple comorbidities. This case report aims to offer valuable insights by detailing a specific instance of wound dehiscence recurrence and exploring the contributing factors, including patient-related aspects, wound care practices, and management strategies. Case reports offer a comprehensive account of the strategies employed to address relapse and the results of those strategies. The limited literature on the recurrence of wound dehiscence poses challenges for healthcare providers in making informed decisions regarding the prevention of this complication.

Case Report

A P2A0 (Live child 1, Youngest child 7 years old) patient presented with a referral for an open surgical wound. The patient reported that the wound had become moist and reopened 10 days prior to admission. The wound was discharging foul-smelling pus. Eight days before admission, the patient sought treatment at Jampang Kulon Regional Hospital, where

wound care and re-suturing were performed. However, the wound reopened two days after the re-suturing procedure, and the patient returned to the same hospital for further care.

The patient had previously undergone a cesarean section 19 days prior to admission (November 28, 2022) due to failed oxytocin drip induction. During a two-day stay at Jampang Kulon Regional Hospital, the patient received antibiotic therapy, including intravenous ciprofloxacin (500 mg three times daily) and intravenous metronidazole (500 mg three times daily). The patient denied any history of contact with COVID-19 patients and reported having received two doses of the Sinovac COVID-19 vaccine. Due to the persistent symptoms and the unavailability of microorganism culture and sensitivity test, the patient was referred to Hasan Sadikin General Hospital (RSHS).

On physical examination, the patient was compos mentis with a high body mass index (BMI) of 42.0, indicating morbid obesity. Obstetric examination revealed an open surgical wound at the site of the previous cesarean section, measuring 15 × 5 × 3 cm, with exposed fascia, and positive findings for both pus and blood. Laboratory results showed hyperglycemia (random blood glucose 400 mg/dL), anemia (Hb 8 g/dL) and leukocytosis (12.890). Wound culture identified *Proteus mirabilis* and *Escherichia coli*, with sensitivity testing indicating susceptibility to Amoxicillin-Clavulanate, Amikacin, Ampicillin-Sulbactam, and Meropenem.

The patient was diagnosed with recurrent wound dehiscence following cesarean delivery for failed oxytocin induction (P2A0, term delivery). Additional diagnoses included postoperative status post-re-suturing (Jampang Kulon Regional Hospital), anemia,

Table 1 Patient Clinical Report on Treatment Period

Date	Wound Condition	Management
17th December 2022		• Wound care by the wound care team • Antibiotics, according to internal medicine
POD 19 Post caesarean section POD 9 Post Re-hecting	Wet, pus mixed with blood comes out of the surgical wound (Fig 1A)	• Meropenem 3 x 1 gr • Levofloxacin 1 x 750mgGV 3x/day • High protein diet • Pus culture and resistance examination
18th December 2022		• Meropenem 3 x 1 gr
POD 20 Post caesarean section POD 10 Post Rehecting	Wet, pus mixed with blood comes out of the surgical wound	• Levofloxacin 1 x 750mg • Change the bandage twice a day
20th December 2022		• Meropenem 3 x 1 gr • Levofloxacin 1 x 750mg
POD 22 Post caesarean section POD 12 Post Rehecting	Wet, pus	• Change the bandage twice a day
22nd December 2022		• Meropenem 3 x 1 gr • Levofloxacin 1 x 750mg
POD 24 Post caesarean section POD 14 Post Rehecting	Wet, pus	• Change the bandage twice a day
24th December 2022		• Amikacin 1x2 gram IV
POD 26 Post caesarean section POD 16 Post Rehecting	Wet, pus (Fig. 1B)	• Change the bandage twice a day

26th December 2022		
POD 28 Post caesarean section POD 18 Post Rehecting	Wet, pus	• Amikacin 1x2 gram IV • Change the bandage twice a day
28th December 2022		•
POD 30 Post caesarean section POD 20 Post Rehecting	Wet, pus	• Amikacin 1x2 gram IV • Change the bandage twice a day
30th December 2022		
POD 32 Post caesarean section POD 22 Post Rehecting	Wet, pus	• Amikacin 1x2 gram IV • Change the bandage twice a day • Repeat pus culture and resistance
1st January 2023		
POD 34 Post caesarean section POD 24 Post Rehecting	Wet, pus (Fig. 1C)	• Change the bandage twice a day • Repeat pus culture and resistance
2nd January 2023		
POD 35 Post caesarean section POD 25 Post Rehecting	Pus (-), blood (-), granulation (-)	• Change the bandage twice a day
6th January 2023		• Cefepime 3x1 gr IV (Day 1)
POD 39 Post caesarean section POD 29 Post Rehecting	Pus (-), blood (-), granulation (-)	• Change bandage twice a day
8th January 2023		
POD 41 Post caesarean section POD 31 Post Rehecting	Pus (-), blood (-), granulation (+) (Fig. 1D)	• Cefepime 3x1 gr IV (Day 3) • Change the bandage twice a day • Planned for rehecting on 10th January 2023
10th January 2023		
POD 43 Post caesarean section POD 33 Post Rehecting	Pus (-), blood (-), granulation (+) (Fig. 1E)	• Cefepime 3x1 gr IV (Day 5) • Change the bandage twice a day • Planned for rehecting on 10th January 2023
10th January 2023		
POD 43 Post caesarean section POD 33 Post Rehectin	Post Rehecting POD 0 (Fig. 1F)	• Subcutaneous tissue sutured using plain catgut no. 1 in an interrupted manner. • The skin was sutured using 2-0 nylon in a horizontal mattress technique. • Cefepime 3x1 gr IV (Day 5)

morbid obesity, and reactive hyperglycemia with differential diagnosis of Type 2 diabetes mellitus. Treatment involved wound care, culture, and sensitivity testing, and collaborative management with the internal medicine team for the treatment of DM and the antibiotic stewardship team. Table 1 shows the clinical report of wound infection during inpatient admission.

With the successful resolution of the infection and improved wound healing, the short-term prognosis appears favorable. However, the long-term prognosis will heavily rely on the patient's ability to manage T2DM, reduce obesity, and maintain strict wound care protocols to prevent recurrence or further complications.



Figure 1 Clinical images showing the improvement of an infected SWD until the infection is healed and resutured

Discussion

Surgical Site Infection (SSI) is frequently regarded as a contributing factor to SWD.[3] SSI is characterised by criteria set forth by the Disease Control and Prevention (CDC) as an infection that manifests within 30 days following a surgical procedure, and it is further categorised into primary and secondary SSI. Superficial incisional, primary and secondary deep/deep incisional SSIs, and organ/space SSIs when they engage structures that extend beyond the muscle and fascial layers. Fifteen SSIs correlate with elevated costs, greater patient dissatisfaction, prolonged hospital stays, and heightened mortality and morbidity rates. Research indicates that approximately 50% of surgical wound infections are preventable through the application of evidence-based strategies. Risk factor prevention is categorised into three phases: preoperative, intraoperative, and postoperative.[10]

Pre-existing morbidities, including preoperative risk factors associated with SSI, include obesity, smoking, blood transfusion, age, malnutrition, immune incompetence, immunosuppressive therapy, longer preoperative hospitalization, and diabetes mellitus.[11] Factors specifically related to a caesarean section include lack of prenatal care, multiple pregnancies, history of previous caesarean section, chorioamnionitis, rupture of membranes before delivery, labor dystocia, emergency delivery, and obstetric services performed at teaching hospitals.[12]

Several perioperative strategies are aimed at reducing the risk of SSI. The goal of skin preparation measures (e.g., preoperative showering or bathing, hair removal, and intraoperative antiseptic skin preparation) is to reduce the number of skin bacteria. A bath with Chlorhexidine gluconate the night before surgery is usually recommended; however, it has not been shown to reduce the risk of SSI.[13] Antimicrobial prophylaxis with cefazolin is a common choice in orthopedic procedures because this agent has excellent in vivo activity against certain gram-positive and gram-negative aerobes (e.g., Escherichia coli, Klebsiella species), time long half-life, and good tissue penetration.[8]

Wound healing optimisation must be pursued in every instance through the application of effective closure methods, the use of closed dressings, minimal dressing changes, and diligent monitoring.[14] In the postoperative period, the formation of

haematomas has been linked to a heightened risk of infection. Ongoing wound drainage correlates with an increased likelihood of infection. Consequently, in the event of ongoing postoperative drainage, it is essential to promptly conduct laboratory tests, such as serum erythrocyte sedimentation rate, C-reactive protein, interleukin-6, and aspiration, while maintaining close monitoring.[8]

From a surgical perspective, obesity is associated with many complications, including impaired skin wound healing, complete wound failure, and fascial dehiscence. Postoperative morbidity is higher in women with morbid obesity than in women with a normal BMI, up to 3- to 5-fold.[15] Vascular insufficiency and changes in the amount of immune mediators present may prolong the inflammatory stage of wound healing and make obese individuals more susceptible to infection. Wound healing is also delayed due to macronutrient and micronutrient deficiencies in obese individuals. Without the right cofactors and enzymes, the wound-healing process and wound integrity are compromised. Nutritional supplements can be given to obese patients before surgery as a possible solution to reduce wound complications.[16]

Caesarean section was conducted on patients due to indications of unsuccessful oxytocin administration. Patients do not receive optimal precautions prior to caesarean section. Interventions to reduce SSI in these patients include the optimal administration of prophylactic antibiotics and the management of preoperative blood glucose levels. Utilising evidence-based strategies is essential for mitigating postoperative complications.[12]

Administration of first-generation cephalosporin (cefazolin) as a preoperative antibiotic is the primary strategy to prevent SSI following caesarean section. A meta-analysis of randomised controlled trials demonstrated that prophylactic administration of first-generation cephalosporins significantly reduced the risk of wound infection and endometritis compared to no antibiotic treatment.[12] Additionally, reduced SSI rates have been observed with the administration of first-generation cephalosporin antibiotics prior to skin incision in contrast to the administration following cord clamping.[17] Due to the patient's obesity, indicated by a BMI exceeding 40 kg/m², the American College of Obstetricians and Gynaecologists (ACOG) advised administering 1 g of intravenous cefazolin within 60 minutes prior to skin incision. For women with a BMI greater than 30 kg/m² or weight exceeding 100 kg, a recommended intravenous infusion dose of cefazolin is 2 g. Higher doses have been explored in women with a BMI >40 kg/m²; however, a retrospective study of morbidly obese women indicated no significant difference in surgical site infections when comparing 2 g and 3 g doses of cefazolin. Recent studies indicate the advantages of administering azithromycin during caesarean delivery.[18] A study conducted by Tita et al. in 2016 indicated that the administration of intravenous azithromycin 500 mg as preoperative antibiotic prophylaxis was linked to a reduced risk of endometritis and wound infection in women undergoing non-elective caesarean sections, in comparison to a placebo.[19]

Preoperative blood sugar control is crucial in both diabetic and non-diabetic populations, as hyperglycemia during the perioperative period serves as an independent indicator of adverse surgical outcomes, including delayed wound healing, increased infection rates, prolonged hospital stays, and elevated postoperative mortality. Thirty-two Uncontrolled hyperglycemia induces osmotic diuresis, leading to fluid and electrolyte imbalance, stimulates ketogenesis, and enhances the production of pro-inflammatory cytokines, resulting in mitochondrial injury, endothelial dysfunction, and immune

deregulation. Achieving adequate glucose control during the perioperative period is linked to improved postoperative outcomes.[20]

Six days after the caesarean section operation, the wound in the surgical area opened and released smelly pus. The patient went to Jampang Kulon Hospital, had the wound treated, and the open surgical wound was re-stitched five days after the wound became infected. During the two days of treatment, the patient received antibiotic therapy Ciprofloxacin 3x500 mg IV and Metronidazole 3x500 mg IV. Management of infections in surgical wounds consists of antibiotics, incision and drainage, wound dressings, and delayed closure. Superficial infections such as cellulitis can be treated with antibiotics alone and do not require incision and drainage. If purulent drainage or exudate accompanies cellulitis, empiric therapy should include adequate coverage of methicillin-resistant Staphylococcus aureus (MRSA).[12]

In cases where the wound exhibits purulent drainage, exudate, or is open due to separation, incision and drainage are required to eliminate the abscess, exudate, and haematoma. Identification of necrotic tissue necessitates sharp debridement utilising forceps, scalpels, or scissors until healthy tissue is discernible. In cases of significant wound damage, packing may be required. Change the wet dressing to a dry one multiple times daily by placing moist gauze into the wound and covering it with dry gauze. The removal of gauze during dressing changes may lead to a reduction in necrotic tissue. Wound dressing changes may be reduced in frequency once necrotic tissue is entirely excised and healthy granulation tissue has commenced formation.[21] The secondary objective of delayed closure is to facilitate the healing of the infected wound by maintaining it in an open state. A review of eight prospective studies indicated that wound reclosure was linked to a healing success rate of 81–100%.[22]

Empirical treatment for necrotizing fasciitis should include agents that are effective against aerobes, including MRSA and anaerobes. The appropriate antibiotic choice is a combination of vancomycin, linezolid, or daptomycin with one of the following options: 1) piperacillin-tazobactam, 2) carbapenem, 3) ceftriaxone plus metronidazole or 4) fluoroquinolones plus metronidazole. In group A streptococcal or beta-hemolytic streptococcus infections, the antibiotic regimen should be narrowed to a combination of penicillin (4 million units every four hours) and clindamycin (600-900 mg every 8 hours). Clindamycin suppresses streptococcal toxin and cytokine production.[23]

In this case, prior to culturing the patient, broad-spectrum antibiotics meropenem at a dosage of 3 x 1 gramme and levofloxacin at 1 x 750 mg were administered. Following the initial culture results indicating the presence of gram-negative bacteria, amikacin was administered intravenously at a dosage of 1x2 grammes. Pus production remains unchanged; a second culture was conducted, revealing the presence of gram-positive bacteria in the repeat results. The antibiotic was substituted with Cefepime 3x1 g IV. Antibiotic administration was modified in accordance with the research recommendations of Mulu W. et al. For gram-positive bacteria, vancomycin, teicoplanin, linezolid, and amikacin were identified as the most effective antibiotics. Resistance rates in gram-negative bacteria are notably elevated, with commonly utilized drugs exhibiting even greater resistance, averaging between 50% and 100%. Meropenem, piperacillin-tazobactam, and amikacin represent the most effective antimicrobial agents against gram-negative bacteria, while ampicillin, amoxicillin-clavulanate, and cefotaxime exhibit the highest levels of resistance.[24]

Alongside antibiotic treatment, appropriate wound care is also conducted.

Inadequate repair procedures may lead to significant harm, including skin loss and infection onset, which can compromise underlying tissue and potentially result in systemic disorders. Infection, commonly found in chronic wounds, represents a significant and unavoidable barrier to the healing process. Bacteria are commonly found in wounds, and while the normal skin flora remains intact, an excess of bacteria that leads to biofilm formation can impede the healing process.[25]

This case report highlights the unique and clinically relevant issue of recurrent surgical wound dehiscence (SWD) in a patient with type 2 diabetes mellitus (T2DM) and morbid obesity, providing detailed insights into multidisciplinary management strategies, including antibiotic stewardship and wound care. The study's strengths lie in its thorough clinical data presentation and its practical recommendations for high-risk populations. However, as a single case report, it is limited in its generalizability and does not establish causal relationships. The absence of a control group and long-term follow-up data further restricts the evaluation of management efficacy and outcomes. Moreover, the findings are specific to a localized healthcare setting, which may not fully represent broader contexts.

Conclusion

Identifying risk factors in patients susceptible to abdominal wall dehiscence is essential for developing effective prevention strategies and appropriate management protocols. The approach to wound dehiscence is contingent upon the associated risk factors and the case's severity, ranging from conservative management to surgical debridement, with options for delayed or immediate wound reclosure.

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Conflict of Interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

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