Wound Dehiscence Following Obstetrics and Gynecology Surgeries: An Observational Study at a Tertiary Hospital in Bandung

Kemala Isnainiasih Mantilidewi,[1] Nur'adilah Firdaus,[2] Andi Kurniadi,[1] Febia Erfiandi,[1] Jessica Kireina,[1] Windy Natasya,[1] Ali Budi Harsono[1]

[1]Department of Obstetrics and Gynecology, Faculty of Medicine Universitas Padjadjaran/ Dr. Hasan Sadikin Hospital, Bandung, Indonesia

[2]Faculty of Medicine Padjdjaran University, Bandung, Indonesia

Corresponding: Kemala Isnainiasih Mantilidewi Email: kemala.i.mantilidewi@unpad.ac.id

Abstract

Introduction: Wound dehiscence is a severe postoperative complication that disrupts an abdominal wound closure which can be caused by endogenous or exogenous flora that infect a surgical wound. Many factors are responsible for surgical site infection in obstetric and gynecology patients considering all the basic standards are ideally maintained in tertiary care hospitals. To identify the characteristics of surgical wound dehiscence (SWD) patients who underwent obstetric and gynecological surgeries at Dr. Hasan Sadikin Hospital from 2021 to 2022.

Methods: This study utilized a quantitative descriptive approach with a retrospective design.

Results: A total of 43 subjects were included in the study and were divided into three groups based on their surgery type: obstetrics (n=11), gynecology (n=7), and gynecological oncology (n=25). The majority of SWD cases were associated with gynecological oncology surgeries. The patients were predominantly aged 18 − 65 years (88%), had superficial SWD (65%), normal BMI (37%), were non-smokers (67%), had a history of steroid medication usage (63%), received prophylactic antibiotics (63%), underwent elective surgery (58%), had laparotomy surgeries (100%), with a duration of ≥180 minutes (35%), and intraoperative bleeding of ≤1500 cc (63%). The surgical wounds were primarily classified as clean type (47%), and therapeutic antibiotics were administered to the majority of patients (74%).

Conclusion: Most of our findings were consistent with existing theories. However, the discrepancies observed in some outcomes can serve as an evaluative tool to assess the adherence of current practices to established guidelines. It is crucial to consider the risk factors for SWD when developing preventive strategies.

Keywords: Intraoperative, Preoperative, Postoperative Surgical Wound Dehiscence, Risk Factors,

Dehisensi Luka Pascaoperasi Obstetri dan Ginekologi: Sebuah Studi Observasi di Rumah Sakit Tersier di Bandung

Abstrak

Pendahuluan: Dehisensi luka pascaoperasi merupakan komplikasi serius yang dapat mengganggu penutupan luka di perut yang disebabkan oleh adanya flora bersumber secara endogen atau eksogen yang menginfeksi luka operasi. Banyak faktor yang berperan dalam infeksi daerah operasi walaupun sudah dilakukannya semua standar operasional yang selalu dipertahankan di rumah sakit perawatan tersier. Untuk mengetahui karakteristik pasien dehisensi luka pascaoperasi obstetri dan ginekologi di RSUP Dr. Hasan Sadikin.

Metode: Penelitian ini merupakan penelitian deskriptif retrospektif yang menganalisis faktor praoperatif, intraoperatif, dan pascaoperatif dari subjek penelitian.

Hasil: Pada studi ini, terdapat 43 subjek yang selanjutnya dikategorikan menjadi tiga kelompok berdasarkan jenis operasinya: obstetri (n=11), ginekologi (n=7), dan onkologi ginekologi (n=25). Sebagian besar kasus berhubungan dengan operasi onkologi ginekologi, berusia 18 − 65 tahun (88%), memiliki dehisensi luka superfisial (65%), indeks massa tubuh normal (37%), bukan perokok. (67%), memiliki riwayat penggunaan obat steroid (63%), menerima antibiotik profilaksis (63%), menjalani operasi elektif (58%), menjalani operasi melalui laparotomi (100%), dengan durasi ≥180 menit (35%), memiliki luka operasi tipe bersih (47%), mengalami perdarahan intraoperative ≤1500 cc (63%), dan mendapatkan antibiotik terapeutik (74%).

Kesimpulan: Sebagian besar hasil studi didapatkan sesuai dengan teori yang telah ada. Kesenjangan yang ditemukan pada luaran studi dapat menjadi alat evaluasi untuk menilai ketaatan pada praktik yang dilakukan untuk kemudian dijadikan pedoman praktik. Penting juga untuk mempertimbangkan faktor risiko dari dehisensi luka pascaoperasi ketika akan mengembangkan strategi preventif.

Kata kunci: Intraoperasi, Dehisensi Luka Pasca Operasi, Praoperasi, Pascaoperasi, Faktor Risiko

Introduction

The management of obstetric and gynecological cases often involves surgical interventions. Such surgical procedures, whether in obstetric or gynecological cases, frequently come with complications, one of which is known as Surgical Wound Dehiscence (SWD) - a situation of which the incision wound from the surgery reopens after the operation. This reopened wound can be either partial or complete. The SWD can occur in any type of surgery, but it is most commonly reported in post-abdominal surgery.[1] According to estimates, this complication occurs in 0.5-3.4% of patients who have undergone abdominal and pelvic surgery.[2] Surgical wound dehiscence can result in increased morbidity and financial burdens for patients and healthcare services. It is also associated with a mortality rate of 10-44%.[3] Despite numerous studies on the incidence and causes of SWD, as well as efforts to prevent it, many patients still suffer from this condition. Therefore, a review of SWD patients' characteristics could help establish more effective preventive measures, reducing its morbidity, mortality, and economic impact. The objective of this study is to identify the characteristics of postoperative obstetric and gynecological patients who experienced SWD at the Department of Obstetrics and Gynecology, Dr. Hasan Sadikin Hospital, from 2021 to 2022.

Methods

This is a retrospective quantitative descriptive study that examines the characteristics of patients who experienced SWD after obstetric and gynecological surgery. We included all patients who had undergone obstetric and gynecological surgery and subsequently experienced SWD at Dr. Hasan Sadikin General Hospital in Bandung from 2021 to 2022. The following criteria were used for exclusion: SWD patients who underwent surgery at another hospital and inaccessible medical record data. The preoperative, intraoperative, and postoperative profiles of the patients with SWD were examined through retrospective data analysis.

We tabulated all patients' data on a customized spreadsheet and performed data analysis using the Microsoft Office Excel statistical tool. This study has been approved by the Ethical Committee of the Faculty of Medicine, Padjadjaran University, with letter number 630/UN6.KEP/EC/2023, and by the Health Research Ethics Committee at Hasan Sadikin Hospital, Bandung, with letter number DP.04.03/X/20601/2023.

Results

A total of 43 cases of SWD met our inclusion and exclusion criteria. The subjects were divided into three categories based on the reason for surgery: obstetrics, gynecology, and gynecologic oncology. It is important to note that the gynecologic oncology group had the highest number of SWD cases, with 25 subjects, as shown in Table 1.

Table 1 Risk Factors Characteristics of Surgical Wound Dehiscence Post Obstetrics, Gynecology, and Gynecologic Oncology Surgeries

Characteristics Frequency (n)	Subjects (n=43)	Percentage (%)
Case Group		
Obstetrics	11	26
Gynecology	7	16
Gynecologic Oncology	25	58
Grade of SWD		
Superficial	28	65
Deep	10	23
N/A	5	12

The characteristics of the study subjects are divided into three groups of risk factors: preoperative, intraoperative, and postoperative (Table 2). The preoperative risk factors include age, BMI, history of smoking, history of steroid medication, history of systemic disease, administration of prophylactic antibiotics, and surgical planning. The intraoperative risk factors consist of surgical access, surgery duration, surgery type, and intraoperative bleeding. The postoperative risk factors group involves wound infection and administration of therapeutic antibiotics.

Most of the SWD found in this study were classified as superficial grade (65%). SWD complications predominantly occurred in the age group of 18-65 years (88%). Among the study subjects, those with a normal Body Mass Index (BMI) constituted the majority (37%), followed by obese I (21%), underweight (19%), overweight (14%), and obese II (5%). Only one patient had a history of smoking (2%), while 27 patients had a history of using steroid medications (63%). Approximately 47% of the patients had a history of systemic disease. A significant portion of patients (63%) received prophylactic antibiotics to prevent SWI. The most commonly prescribed prophylactic antibiotics were cefazoline and ceftriaxone. All subjects underwent surgery with a laparotomy incision (100%). Elective surgical planning was prevalent in most cases (58%), and a substantial proportion of surgeries lasted for ≥180 minutes (35%). The majority of subjects experienced intraoperative bleeding of ≤1500 cc (63%). The most prevalent classification of surgical wounds was a clean surgical wound (47%). A total of 20 cases (46%) underwent wound base culture examination, revealing that 13 cases (30%) were infected and 7 cases (16%) were not. Therapeutic antibiotics were administered postoperatively to 77% (n = 33) of the patients. Ceftriaxone and cefazoline were the most frequently administered therapeutic antibiotics in this study.

Table 2 Risk factors of Surgical Wound Dehiscence

Characteristics Frequency (n)	Subjects (n=43)	Percentage (%)
Preoperative Factors		
Age		
1-12 years	0	0
13-17 years	2	5
18-65 years	38	88
≥ 65 years	3	7
N/A	0	0
BMI		
Underweight	8	19
Normal	16	37
Overweight	6	14
Obese I	9	21
Obese II	2	5
Obese III	0	0
N/A	2	5
Smoking History		
Smoking	1	2
Not Smoking	29	67
N/A	13	30
Steroid Medications History		
Yes	27	63
No	10	23
N/A	6	14
Systemic Disease		
Yes	20	47
No	20	47
N/A	3	7
Prophylactic Antibiotic		
Given	27	63
Not Given	7	16
N/A	9	21
Planning of Surgery		
Elective	25	58
Emergency	10	23
Not available	8	19
Intraoperative Factors		
Surgical Incision		

Laparotomy	43	100
Laparoscopy	0	0
Not available	0	0
Duration of Surgery		
<120 minutes	13	30
120-150 minutes	3	7
150-180 minutes	0	0
≥180 minutes	15	35
N/A	12	28
Surgical Wound Classification		
Clean	20	47
Clean-Contaminated	9	21
Contaminated	2	5
Dirty/Infected	1	2
N/A	11	26
Bleeding		
≤1500 cc	27	63
>1500 cc	3	7
Not available	13	30
Postoperative Factors		
Infection		
Yes	13	30
No	7	16
Not available	23	53
Therapeutic Antibiotic		
Given	33	77
Not Given	1	2
Not available	9	21

Table 3, 4, and 5 illustrate the characteristics of SWD cases following obstetrics, gynecology, and gynecologic oncology surgeries, respectively. Within each group, the majority of SWD cases were in the adult age group of 18-65 years. The most prevalent type of SWD was the superficial grade. Regarding BMI distribution, the obstetric group had a majority of subjects with normal BMI (27%), overweight (27%), and obesity I (27%). Similar patterns were observed in the gynecology and gynecologic oncology groups, where the majority of subjects fell into the normal BMI category (43% and 40%, respectively). Notably, no subjects in the obstetric and gynecology groups had a history of smoking, while only 1 patient (4%) in the gynecologic oncology group reported a history of smoking, with the last smoking being one day before the surgery. Systemic disease was present in 18% of the obstetric group, 43% of the gynecology group, and 60% of the gynecologic oncology group. Prophylactic antibiotics were administered to 64% of subjects in the obstetric group, 57% in the gynecology group, and 64% in the gynecologic oncology group. In the obstetric group, the majority of cases were conducted as emergency surgeries (82%), while in contrast, all cases in the gynecology group were performed electively (86%). In the gynecologic oncology group, 17 cases (68%) were elective, and 1 case (4%) was an emergency procedure.

The most common surgery duration category in the obstetric group was <120 minutes (64%), in the gynecology group it was <120 minutes (29%), 120–150 minutes (29%), and ≥180 minutes (29%), and in the gynecologic oncology group it was ≥180 minutes (48%). In the obstetric group, 1 patient (9%) had intraoperative bleeding exceeding 1500 cc, while in the gynecologic oncology group, 2 patients (8%) experienced this, and there were no instances in the gynecology group. Across all groups, the prevailing type of surgical wound classification was a clean surgical wound, accounting for 55% of obstetric cases, 43% of gynecologic cases, and 44% of gynecologic oncology cases.

Therapeutic antibiotics were frequently administered in all groups, with 91% in obstetrics, 57% in gynecology, and 76% in gynecologic oncology. However, in some cases, it was difficult to determine whether an infection was present or not. The available data only indicated that 4 obstetric patients (36%), 1 gynecology patients (14%), and 8 gynecologic oncology patients (32%) had infections.

Table 3 Risk Factors Characteristics of Surgical Wound Dehiscence in Obstetrics Cases

Characteristics Frequency (n)	Obstetrics Cases (n=11)	Percentage (%)
Grade of SWD		
Superficial	11	100
Deep	0	0
N/A	0	0
Preoperative Factors		
Age		
1-12 years	0	0
13-17 years	0	0
18-65 years	11	100
≥65 years	0	0
N/A	0	0
BMI		
Underweight	1	9
Normal	3	27
Overweight	3	27
Obese I	3	27
Obese II	1	9
Obese III	0	0
N/A	0	0
Smoking History		
Smoking	0	0
Not Smoking	7	64
N/A	4	36
Steroid Medications History		
Yes	8	73
No	2	18
N/A	1	9
Systemic Disease		
Yes	2	18
No	8	73
N/A	1	9
Prophylactic Antibiotic		
Given	7	64
Not Given	2	18
Not available	2	18
Planning of Surgery		
Elective	2	18
Emergency	9	82
Not available	0	0
Intraoperative Factors		
Surgical Incision		
Laparotomy	11	100
Laparoscopy	0	0
Not available	0	0
Duration of Surgery		
<120 minutes	7	64
120-150 minutes	0	0
150-180 minutes	0	0
≥ 180 minutes	1	9
Not available	3	27
Surgical Wound Classification		
Clean	6	55
Clean-Contaminated	2	18
Contaminated	0	0
Dirty/Infected	0	0
N/A	3	27
Bleeding		
≤1500 cc	7	64
> 1500 cc	1	9
Not available	3	27
Postoperative Factors		
Infection		
Yes	4	36
No	3	27
Not available	4	36
Therapeutic Antibiotic		
Given	10	91
Not Given	0	0
Not available	1	9

Table 4 Risk Factors Characteristics of Surgical Wound Dehiscence in Gynecologic Cases

Characteristics Frequency (n)	Gynecology Cases (n=7)	Percentage (%)
Grade of SWD		
Superficial	5	71
Deep	2	29
Not available	0	0
Preoperative Factors		
Age		
1-12 years	0	0
13-17 years	0	0
18-65 years	6	86
≥ 65 years	1	14
Not available	0	0
BMI		
Underweight	2	29
Normal	3	43
Overweight	0	0
Obese I	1	14
Obese II	0	0
Obese III	0	0
Not available	1	14
Smoking History		
Smoking	0	0
Not Smoking	6	86
Not available	1	14
Steroid Medications History		
Yes	4	57
No	2	29
Not available	1	14
Systemic Disease		
Yes	3	43
No	3	43
Not available	1	14
Prophylactic Antibiotic		
Given	4	57
Not Given	2	29
Not available	1	14
Planning of Surgery		
Elective	6	86
Emergency	0	0
Not available	1	14
Intraoperative Factors		
Surgical Incision		
Laparotomy	7	100
Laparoscopy	0	0
Not available	0	0
Duration of Surgery		
<120 minutes	2	29
120-150 minutes	2	29
150-180 minutes	0	0
≥180 minutes	2	29
Not available	1	14
Surgical Wound Classification		
Clean	3	43
Clean-Contaminated	2	29
Contaminated	1	14
Dirty/Infected	0	0
Not available	1	14
Bleeding		
≤1500 cc	6	86
>1500 cc	0	0
N/A	1	14
Postoperative Factors		
Infection		
Yes	1	14
No	1	14
Not available	5	71
Therapeutic Antibiotic		
Given	4	57
Not Given	1	14
Not available	2	29

Table 5 Risk Factors of Surgical Wound Dehiscence in Gynecologic Oncology Cases

Characteristics Frequency (n)	Gynecologic Oncology (n=25)	Percentage (%)
Grade of SWD		
Superficial	12	48
Deep	8	32
Not available	5	20
Preoperative Factors		
Age		
1-12 years	0	0
13-17 years	2	8
18-65 years	21	84
≥65 years	2	8
Not available	0	0
BMI		
Underweight	5	20
Normal	10	40
Overweight	3	12
Obese I	5	20
Obese II	1	4
Obese III	0	0
Not available	1	4
Smoking History		
Smoking	1	4
Not Smoking	16	64
Not available	8	32
Steroid Medications History		
Yes	15	60
No	6	24
Not available	4	16
Systemic Disease		
Yes	15	60
No	9	36
Not available	1	4
Prophylactic Antibiotic		
Given	16	64
Not Given	3	12
Not available	6	24
Planning of Surgery		
Elective	17	68
Emergency	1	4
Not available	7	28
Intraoperative Factors		
Surgical Incision		
Laparotomy	25	100
Laparoscopy	0	0
Not available	0	0
Duration of Surgery		
<120 minutes	4	16
120-150 minutes	1	4
150-180 minutes	0	0
≥ 180 minutes	12	48
Not available	8	32
Surgical Wound Classification		
Clean	11	44
Clean-Contaminated	5	20
Contaminated	1	4
Dirty/Infected	1	4
Not available	7	28
Bleeding		
≤1500 cc	14	56
> 1500 cc	2	8
Not available	9	36
Postoperative Factors		
Infection		
Yes	8	32
No	3	12
Not available	14	56
Therapeutic Antibiotic		
Given	19	76
Not Given	0	0
Not available	6	24

Discussion

Based on the presented results, it is evident that the most frequent type of SWD is the superficial type (65%). This type of wound indicates an incision that only extends to the subcutaneous layer. On the other hand, if the incision reaches the fascia and muscles, it is categorized as a deep SWD.[4]

Most of the SWD patients (58%) were from the gynecologic oncology group. This finding is different from the study conducted by Metgud et al.,[5] which found that SWD was more common in obstetric cases. This could be due to the higher prevalence of emergency surgeries in obstetric cases, which may result in less efficient preoperative evaluations and unnecessary assessments.[6] When we specifically analyzed the obstetric group, our results confirmed that emergency surgeries were more frequent in cases of SWD. In fact, 82% of the patients in the obstetric group who experienced SWD underwent emergency surgery. This factor may contribute significantly to the higher risk of SWD in the obstetric group. On the other hand, the gynecologic oncology group may be influenced by different factors, such as a history of steroid medication, systemic disease, and extended surgery duration. As shown in Table 4, 60% of the subjects in the gynecologic oncology group had a history of steroid medication usage and systemic diseases. Furthermore, a majority of patients (48%) in the gynecologic oncology group underwent surgeries lasting for ≥180 minutes. These factors likely contribute to the higher occurrence of SWD cases within this group.

In terms of age distribution, 88% of the study subjects who experienced SWD belonged to the adult age group (18-65 years). This trend might be attributed to the higher number of obstetric and gynecology patients in this age range. This finding is different from other studies that show a higher prevalence of SWD among individuals aged ≥60-65 years.[7,8] However, there is one study that suggests the risk of SWD decreases with age progression.[9]

Our study discovered that 40% of the subjects had a BMI above the normal range, which includes overweight, obese I, obese II, and obese III categories. This percentage is higher than the number of subjects in the normal category. This finding is consistent with a retrospective study conducted by Walming et al., which identified BMI ranges of 25-30, 30-35, and >35 as risk factors for SWD.[10] Furthermore, a significant proportion of the subjects had a BMI indicating underweight, comprising 19% of the total sample. This could be associated with malnutrition, which can negatively impact wound healing. In the context of wound healing, it is crucial to increase protein intake to meet the increased requirements during the inflammatory, proliferative, and remodeling phases.[9,11]

A history of systemic disease increases the risk of SWD.[1] In this study, the most commonly identified systemic disease was anemia (Hb<13.0g/dL in men and <12.0g/dL in women) (n=12). In our study, anemia was found in 9% (n=1) of the obstetric group, 29% (n=2) of the gynecology group, and 32% (n=8) of the gynecologic oncology group. Other systemic diseases identified in this study included hypoalbuminemia (n=6), hypertension (n=6), and diabetes and other blood disorders (n=1 each). It is important to note that some patients might have been afflicted by more than one systemic disease.

Smoking can significantly impact the wound-healing process.[12] This is due to hypoxemia and tissue necrosis.[13] However, in this study, only one patient reported smoking. This could be related to gender dynamics, as all obstetrics and gynecology patients in the study were female. It's noteworthy that in 2021, 64.7% of adult men and 2.3% of adult women in Indonesia smoked tobacco.[14] Additionally, there is a possibility that patients who suffered from SWD might have been passive smokers, exposed to cigarette smoke from their spouses or other close relatives. Unfortunately, the smoking history of these family members isn't available and is difficult to ascertain.

Past research has shown that the majority of patients with SWD (surgical wound dehiscence) had a history of using

steroid medications.[8] Steroid usage is known to hinder the response of inflammatory cells, fibroblasts, collagen formation, capillary formation, and the migration of epithelium.[15] The results of this study support these findings, as 63% of the subjects had a history of using steroid medication.

Interestingly, this study only included subjects who underwent surgery with a laparotomy incision (100%) and did not include any patients who received a laparoscopic incision. The size of the wound is correlated with the overall time it takes for the wound to heal. Multiple studies have shown that key wound characteristics, such as area, depth, and peripheral arterial disease, can affect the healing outcomes of wounds. Specifically, the duration of ulcer wound healing is directly related to the area of the ulcer.[16]

Previous studies have also indicated that the risk of SWD increases in surgeries lasting over 2.5 hours.[3] Similarly, in this study, a notable number of 15 cases (35%) underwent surgical procedures lasting ≥180 minutes, with 12 cases from the gynecologic oncology group, 2 from the gynecology group, and 1 from the obstetric group.

In general, this study identified the most common classification of surgical wounds as follows: clean (47%), clean-contaminated (21%), contaminated (5%), and dirty/infected (2%). This finding slightly differs from previous studies, which stated that SWD is more prevalent in clean-contaminated, contaminated, and infected surgical types.[17] Our results may be caused by inappropriate preoperative aseptic and antiseptic protocols, particularly in emergency cases. However, these findings should be further corroborated by additional research.

Intraoperative bleeding can compromise wound healing by involving mechanisms of coagulation disorders secondary to bleeding, hemodilution, or consumption of hemostatic factors.[18] Additionally, several studies have demonstrated that bleeding exceeding 1500 cc in adult patients can impact the concentration and effectiveness of preoperative prophylactic antibiotics, necessitating repeated dosing. In this study, 3 patients (7%) experienced bleeding that surpassed 1500 cc and underwent surgeries lasting ≥3 hours. These three patients received additional antibiotic doses.

According to our hospital's antibiotics guide, prophylactic antibiotics are given for clean and clean-contaminated surgical wounds. The antibiotics used include 1st and 2nd generation cephalosporins, along with metronidazole, which is only added if anaerobic bacterial infection is suspected.[19] In this study, there were 20 patients (47%) with clean surgical wounds, 9 patients (21%) with clean-contaminated surgical wounds, 2 patients (5%) with contaminated surgical wounds, and 1 patient (2%) with infected/dirty surgical wounds. Out of the 29 patients, 3 (10%) were administered ceftriaxone and cefotaxime, which are classified as third-generation cephalosporins. Further investigation is necessary to ascertain whether the administration of these third-generation cephalosporins adhered to the prevailing guidelines.

Therapeutic antibiotics in this study refer to antibiotics administered postoperatively to patients with contaminated and dirty/infected surgical wounds. The subjects in this study received various therapeutic antibiotics, including ceftriaxone (53%), cefazolin (7%), metronidazole (12%), cefixime (2%), tigecycline (2%), ciprofloxacin (2%), and clindamycin (2%). The antibiotics administered could be one or two types at the same time. The study found that the majority of patients with surgical wound infections had received therapeutic antibiotics (77%). However, 30% of these patients still experienced infections in the surgical wound. This figure is higher than the infection rate in patients who did not

receive antibiotics, which was only 16%. If prophylactic and therapeutic antibiotic regimens are appropriate, the incidence of surgical wound infections should be lower. Antibiotic resistance may be a contributing factor to this trend. Research from 2020 and 2021 has shown that gram-negative bacteria often exhibit resistance to ceftriaxone.[20,21]

In this study, the presence of certain missing variables could potentially explain the inconsistent results observed in comparison with prior studies. To enhance accuracy and mitigate human errors in the stages of recording, storing, and interpreting medical records, it is necessary to adopt a more efficient and comprehensive approach to gathering patient data. Furthermore, this study had a relatively small sample and all the data were collected from a single referral center with a high prevalence of malignancy cases, which could lead to bias. A larger study with a more diverse sample is needed to further confirm the results of our study.

Conclusions

To conclude, this study analyzed the characteristics of patients who experienced surgical wound dehiscence following obstetric and gynecology surgeries. The majority of our results were consistent with previously established theories. However, the discrepancies in some of the outcomes could be used as an evaluative tool to assess the alignment of current practices with established guidelines. It is crucial to consider the risk factors for surgical wound dehiscence before implementing preventive methods. Close monitoring for signs of infection in postoperative wounds and thorough implementation of infection prevention practices during the perioperative period could improve the outcome of surgical wound dehiscence and lead to significant cost savings, especially in settings with limited resources. Further research with larger and more diverse samples, as well as a more comprehensive design, is required to confirm our findings.

Conflict of interest

None declared.

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Contributors

KIM, AK, ABH, and NF conceived the study. NF and WN collected and analyzed the data. KIM, NF, FE, and JK drafted the manuscript. All agreed on this version of the manuscript for publication.

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