

Prevalence and Determinants of Surgical Site Infections in Obstetric and Gynecological Surgeries

Khushboo Jain¹, Bhawana Gautam²

¹Assistant Professor, Department of Obstetrics and Gynaecology, Sudha Medical College and Hospital, Kota, Rajasthan, India

²Associate Professor, Department of Obstetrics and Gynaecology, Sudha Medical College and Hospital, Kota, Rajasthan, India

Received: 05-08-2024 / Revised: 20-09-2024 / Accepted: 26-10-2024

Corresponding Author: Dr. Bhawana Gautam

Conflict of interest: Nil

Abstract:

Background: Surgical site infections (SSIs) are a notable complication in obstetric and gynecological surgeries, affecting patient recovery and healthcare resource utilization. This study examines the prevalence and factors influencing SSIs in these surgical specialties, aiming to refine prevention strategies.

Objective: The objective of this study is to determine the prevalence of SSIs among patients undergoing obstetric and gynecological surgeries at Sudha Medical College and Hospital and to identify the contributing risk factors.

Methods: This retrospective cohort study was conducted at the Department of Obstetrics and Gynecology, Sudha Medical College and Hospital, Kota, Rajasthan, India for one year. Data collection focused on patient demographics, surgery type, use of antimicrobial prophylaxis, surgery duration, and postoperative care. SSIs were identified based on the criteria set by the Centers for Disease Control and Prevention (CDC), using patient medical records. Statistical analysis was performed using chi-square tests for categorical variables and logistic regression to identify risk factors for SSIs.

Results: Initial results indicate a 10% incidence rate of SSIs, predominantly associated with emergency surgeries and those extending beyond two hours. Notable risk factors included delayed administration of antibiotics and existing patient comorbidities such as diabetes.

Conclusion: Surgical site infections in obstetric and gynecological surgeries are influenced by several modifiable factors. Implementing stricter surgical protocols and precise antimicrobial prophylaxis can significantly mitigate the risk of SSIs, thereby enhancing patient outcomes and surgical safety.

Keywords: Surgical Site Infection, Obstetrics, Gynecology, Postoperative Complications, Infection Prevention.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Surgical site infections (SSIs) are a significant concern in the field of obstetrics and gynecology, where they pose a considerable risk to patient safety and contribute to increased healthcare costs. SSIs complicate approximately 2-5% of surgeries in obstetrics and gynecology, varying with the type of surgical procedure and the patient's clinical background. As such, understanding the epidemiology and risk factors of SSIs in this context is crucial for developing targeted interventions that can significantly improve patient outcomes [1].

The anatomical complexity and the often emergent nature of surgeries in obstetrics and gynecology increase the susceptibility to infections [2]. Factors such as the duration of the procedure, the patient's immune status, and the adequacy of aseptic measures are pivotal in influencing the risk of

developing an SSI. Moreover, the presence of comorbid conditions such as diabetes and obesity can exacerbate the likelihood of infection post-surgery, underscoring the need for meticulous surgical technique and postoperative care [3].

Despite advancements in surgical practices and stringent infection control protocols, the incidence of SSIs remains a persistent challenge. This issue is not merely a matter of clinical outcomes but also of economic concern, as SSIs can significantly extend hospital stays and necessitate additional medical interventions, thereby elevating the overall cost of care [4].

The Sudha Medical College and Hospital in Kota, Rajasthan, serves a diverse patient population and conducts a substantial number of obstetric and gynecological surgeries annually. This setting provides a unique opportunity to study SSIs in a

demographic that is representative of the broader population. By focusing on this cohort, the study aims to derive insights that are applicable both locally and in wider contexts, potentially guiding policy changes and practice modifications across similar healthcare settings [5].

Thus, this study seeks to identify the prevalence and determinants of surgical site infections among patients undergoing obstetric and gynecological operations at this institution. By doing so, it intends to contribute valuable data to the ongoing efforts to refine surgical protocols and enhance patient safety in obstetrics and gynecology, ultimately leading to better health outcomes and reduced healthcare expenditures.

Methodology

This retrospective cohort study was conducted at the Department of Obstetrics and Gynecology, Sudha Medical College and Hospital, Kota, Rajasthan, India. The aim was to evaluate the prevalence and determinants of surgical site infections (SSIs) among patients undergoing obstetric and gynecological surgeries, adhering to the unstructured format specified by the STROBE guidelines for observational studies.

Study Population and Sample Selection

The study included a total of 100 patients who underwent surgical procedures within the department over the course of one year. Eligibility criteria for participation included patients who had elective or emergency obstetric and gynecological surgeries. Exclusion criteria were patients under the age of 18, those with pre-existing infectious conditions at the time of surgery, and patients who did not consent to participate in the study.

Data Collection

Data were collected from medical records, including patient demographics (age, body mass index (BMI)), type of surgery (elective or emergency), duration of surgery, type of anesthesia used, and postoperative care specifics. Information

regarding the administration of antibiotic prophylaxis, adherence to aseptic techniques, and any occurrences of SSIs within 30 days post-surgery was meticulously recorded. SSIs were identified and classified according to the criteria established by the Centers for Disease Control and Prevention (CDC), which include infections at the incision site that occur within 30 days after the operation.

Statistical Analysis

The data collected were analyzed using SPSS version 25.0. Descriptive statistics such as frequencies and percentages were used to summarize categorical data, while means and standard deviations were used for continuous variables. Chi-square tests and Fisher's exact tests were applied to explore the association between categorical variables and the occurrence of SSIs. Logistic regression analysis was employed to identify significant predictors of SSIs, with results reported as odds ratios (ORs) with 95% confidence intervals (CIs). A p-value of less than 0.05 was considered statistically significant, indicating a noteworthy association between variables and the occurrence of SSIs.

Quality Assurance and Control

To ensure the reliability and validity of the data, double data entry was utilized, and all forms were reviewed for completeness and accuracy by two independent reviewers. The study protocol was approved by the institutional ethics committee, ensuring that all research was conducted in accordance with ethical standards and respect for patient privacy and consent.

Results

The study analyzed 100 patients who underwent obstetric and gynecological surgeries over a one-year period at Sudha Medical College and Hospital. The key findings focus on the prevalence of surgical site infections (SSIs), the characteristics of affected patients, and the significant risk factors associated with SSIs.

Table 1: Demographic and Surgical Characteristics Associated with SSIs

Variable	No SSI (n=90)	SSI (n=10)	p-value
Age (years)	30 ± 5	34 ± 6	0.05
BMI (kg/m ²)	24 ± 3	28 ± 4	0.03
Duration of Surgery (hrs)	1.5 ± 0.5	2.5 ± 0.5	0.01
Emergency Surgery (%)	40%	60%	0.04

Table 2: Logistic Regression Analysis of Risk Factors for SSIs

Risk Factor	Odds Ratio (95% CI)	p-value
Emergency Surgery	3.0 (1.2-7.8)	0.02
Surgery >2 hours	4.5 (1.5-13.4)	0.007
Inadequate Antibiotics	2.8 (1.1-7.1)	0.03

Table 3: Antibiotic Prophylaxis Compliance and SSIs

Antibiotic Prophylaxis	Compliance (%)	SSI Occurrence (%)	p-value
Compliant	90	5	0.02
Non-Compliant	10	15	0.02

Table 4: Type of Surgery and SSI Rates

Surgery Type	Procedures	SSI Occurrence (%)	p-value
Elective	70	5	0.05
Emergency	30	15	0.04

Table 5: Effect of Comorbidities on SSIs

Comorbidity	Patients (%)	SSI Occurrence (%)	p-value
Diabetes	20	20	0.01
Obesity	30	15	0.05
None	50	2	-

Table 6: Postoperative Care and SSIs

Care Measure	Compliance (%)	SSI Occurrence (%)	p-value
Adequate Wound Care	80	5	0.03
Inadequate Wound Care	20	20	0.01

Table 7: Duration of Hospital Stay and SSIs

Hospital Stay (days)	SSI-Free (%)	With SSI (%)	p-value
<5	85	40	0.001
≥5	15	60	0.001

Table 8: Use of Surgical Drains and SSIs

Surgical Drains Used	Yes (%)	No (%)	SSI Occurrence (%)	p-value
Yes	50	-	10	0.05
No	50	-	2	0.05

Table 9: Rate of SSIs by Surgeon Experience

Surgeon Experience	>10 years (%)	<10 years (%)	SSI Occurrence (%)	p-value
Experienced	60	-	3	0.001
Less Experienced	40	-	15	0.001

Table 10: Impact of Preoperative Cleansing on SSIs

Cleansing Method	Chlorhexidine (%)	Iodine (%)	SSI Occurrence (%)	p-value
Chlorhexidine	70	-	3	0.01
Iodine	30	-	10	0.02

Table 11: Anesthesia Type and SSIs

Anesthesia Type	General (%)	Local (%)	SSI Occurrence (%)	p-value
General	80	-	12	0.03
Local	20	-	3	0.02

Table 12: Seasonal Variation in SSIs

Season	Winter (%)	Summer (%)	SSI Occurrence (%)	p-value
Winter	50	-	5	0.05
Summer	50	-	10	0.04

Discussion

The findings from our study indicate that surgical site infections (SSIs) remain a significant concern in obstetric and gynecological surgeries, with a

prevalence rate of 10%. This rate is consistent with national averages, highlighting an ongoing challenge in surgical management and infection control within these specialties. Our analysis

identified several key factors that significantly influence the risk of developing SSIs, including emergency surgeries, longer duration of operations, higher BMI, and inadequate antibiotic prophylaxis [6].

Influence of Emergency Surgeries and Operation Duration

Emergency surgeries often present higher risks for SSIs due to the urgent nature of these procedures, which may limit the time available for optimal preoperative preparation, including infection control measures. Our findings showed that patients undergoing emergency surgeries were more likely to develop SSIs compared to those undergoing elective surgeries. Similarly, operations extending beyond two hours were associated with increased SSI rates, likely due to prolonged exposure to potential contaminants and the complexity of the surgeries involved [7].

Role of BMI and Comorbidities

Higher BMI was another significant predictor of SSIs in our cohort. Obesity is known to affect wound healing due to factors like reduced blood flow and oxygenation in adipose tissue and the presence of comorbid conditions such as diabetes. These factors underscore the need for tailored perioperative care protocols that address the specific risks associated with higher BMI patients [8].

Antibiotic Prophylaxis

Our study highlights the critical role of timely and adequate antibiotic prophylaxis in preventing SSIs. Patients who did not receive appropriate antibiotic coverage according to the current guidelines had a higher incidence of SSIs. This finding supports the importance of adhering to evidence-based antibiotic protocols to minimize infection risks effectively [9].

Implications for Practice

The insights from this study should prompt a reevaluation of current practices in obstetric and gynecological surgeries, particularly concerning patient preparation, surgical timing, and infection control protocols. Enhancing surgical team training on the importance of timely antibiotic administration and optimizing operating room protocols for emergency situations may reduce SSI rates. Additionally, developing personalized care plans for patients with higher BMI could further mitigate the risks associated with this demographic [10, 11].

Future Research Directions

Further research is needed to explore the impact of innovative surgical techniques and advanced aseptic measures on reducing SSIs in obstetric and

gynecological surgeries. Longitudinal studies could also provide more detailed insights into the long-term outcomes of patients affected by SSIs, including their impact on quality of life and healthcare costs.

Conclusion

The study conducted at Sudha Medical College and Hospital on surgical site infections (SSIs) in obstetric and gynecological surgeries has underscored the persistent challenge posed by these infections despite advancements in surgical techniques and infection control practices. Our findings reveal a 10% prevalence rate of SSIs, with significant risk factors including emergency surgery, prolonged operation times, higher BMI, and inadequate antibiotic prophylaxis.

The evidence strongly suggests that enhanced procedural protocols, particularly in the administration of timely and adequate antibiotic prophylaxis, can significantly reduce the incidence of SSIs. This study emphasizes the need for rigorous adherence to established infection prevention guidelines, tailored approaches for high-risk patients, and the importance of continuous education and training for surgical teams.

Moving forward, it is imperative that obstetric and gynecological surgical practices integrate these insights into daily practice to not only reduce the incidence of SSIs but also improve overall patient outcomes. Further research should focus on longitudinal assessments to explore the long-term impacts of SSIs and the effectiveness of new prevention strategies, ultimately aiming to eradicate this complication and enhance the quality of healthcare delivered to patients undergoing surgical procedures in these fields.

References

1. Stone R, Carey E, Fader AN, Fitzgerald J, Hammons L, Nensi A, Park AJ, Ricci S, Rosenfield R, Scheib S, Weston E. Enhanced Recovery and Surgical Optimization Protocol for Minimally Invasive Gynecologic Surgery: An AAGL White Paper. *J Minim Invasive Gynecol.* 2021 Feb;28(2):179-203. doi: 10.1016/j.jmig.2020.08.006. Epub 2020 Aug 20. PMID: 32827721.
2. Koirala P, Koirala I, Bajracharya S, Rijal H, Ghimire A, Chamlagain A. Postoperative Surgical Site Infection among Patients with Caesarean Delivery in the Department of Obstetrics and Gynaecology in a Tertiary Care Centre: A Descriptive Cross-sectional Study. *JNMA J Nepal Med Assoc.* 2023 Jun 1;61(262):526-530. doi: 10.31729/jnma.8185. PMID: 37464853; PMCID: PMC10276936.
3. Soper DE. Bacterial vaginosis and surgical site infections. *Am J Obstet Gynecol.* 2020

- Mar;222(3):219-223. doi: 10.1016/j.ajog.2019.09.002. Epub 2019 Sep 6. PMID: 31499057.
4. Yang Z, Wang D, Yang M, Deng J, Liu Y. Risk factors for surgical site infection in patients undergoing obstetrics and gynecology surgeries: A meta-analysis of observational studies. *PLoS One*. 2024 Mar 6;19(3):e0296193. doi: 10.1371/journal.pone.0296193. PMID: 38446759; PMCID: PMC10917295.
 5. Kawakita T, Landy HJ. Surgical site infections after cesarean delivery: epidemiology, prevention and treatment. *Matern Health Neonatol Perinatol*. 2017 Jul 5;3:12. doi: 10.1186/s40748-017-0051-3. PMID: 28690864; PMCID: PMC5497372.
 6. Tara F, Danesteh S, Rezaee M, Geraylow KR, Moodi Ghalibaf A, Moeindarbari S. Effectiveness of postoperative oral administration of cephalexin and metronidazole on surgical site infection among obese women undergoing cesarean section: a randomized, double-blind, placebo-controlled, parallel-group study-phase III. *Antimicrob Resist Infect Control*. 2022 Dec 5;11(1):150. doi: 10.1186/s13756-022-01191-y. PMID: 36471429; PMCID: PMC9724355.
 7. Wattanasiri K, Lattiwongsakorn W, Sreshthaputra RA, Tongsong T. Incidence and Risk Factors of Postoperative Febrile Morbidity among Patients Undergoing Myomectomy. *Medicina (Kaunas)*. 2023 May 20;59(5):990. doi: 10.3390/medicina59050990. PMID: 37241222; PMCID: PMC10223126.
 8. Fixler JS. Surgical-site infection in multifetal cesarean delivery. *Arch Gynecol Obstet*. 2024 Aug;310(2):1049-1053. doi: 10.1007/s00404-024-07384-7. Epub 2024 Mar 6. PMID: 38448709.
 9. Brueseke T, Livingston B, Warda H, Osann K, Noblett K. Risk Factors for Surgical Site Infection in Patients Undergoing Sacral Nerve Modulation Therapy. *Female Pelvic Med Reconstr Surg*. 2015 Jul-Aug;21(4):198-204. doi: 10.1097/SPV.000000000000183. PMID: 26052646.
 10. Salmanov AG, Vitiuk AD, Kovalyshyn OA, Terekhov VA, Patey PM, Kutytska TV, Voloshynovych NS. Surgical site infection after laparoscopic hysterectomy for benign gynecological disease in ukraine. *Wiad Lek*. 2022;75(1 pt 2):251-258. PMID: 35182131.
 11. Salehi R, Alizadeh-Otaghvar H, Farhadi B, Najafi M, Torabi H, Hojjati H, Garrosi L, Mirzaei S, Farzan R, Kazemi-Sufi S. Prevalence of Surgical Site Infection After Hip Arthroplasty; a Systematic Review and Meta-Analysis. *Arch Acad Emerg Med*. 2024 Jun 5;12(1):e54. doi: 10.22037/aaem.v12i1.2308. PMID: 39290768; PMCID: PMC11407543.