

Risk Factor Assessment for Wound Dehiscence Following Caesarean Section: A Study from a Tertiary Care Center in Bihar

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Abstract:

Background: Wound dehiscence is a significant postoperative complication following caesarean sections, leading to increased morbidity, prolonged hospital stays, and higher healthcare costs. Various maternal, surgical, and postnatal factors contribute to wound dehiscence, making early identification of high-risk cases crucial for improving surgical outcomes. Factors such as obesity, diabetes, hypertension, anemia, prolonged labor, chorioamnionitis, surgical technique, and improper postoperative wound care have been implicated in wound healing complications. This study aims to evaluate the risk factors associated with wound dehiscence following caesarean sections at a tertiary care hospital in Bihar.

Objectives: This study aims to assess the prevalence and risk factors of wound dehiscence in post-caesarean patients, evaluate the impact of maternal comorbidities and surgical factors, and analyze the relationship between intraoperative and postoperative complications and wound healing.

Methods: A prospective observational study was conducted at the Department of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna, Bihar, India, over twelve months. A total of 120 post-caesarean patients who developed wound dehiscence were included in the study and compared with 120 matched controls who had uneventful wound healing. Data on patient demographics, maternal comorbidities (diabetes, hypertension, anemia), BMI, nutritional status, duration of labor, presence of chorioamnionitis, intraoperative factors (type of incision, duration of surgery, blood loss), and postoperative care were collected and analyzed. The wound was assessed using standard criteria, including signs of infection, gaping, and serous or purulent discharge. Statistical analysis was performed to determine significant risk factors.

Results: The incidence of wound dehiscence was 8.5% among post-caesarean patients. Obesity (BMI > 30 kg/m²) was observed in 32% of cases, while diabetes mellitus (24%) and anemia (36%) were also significantly associated with wound dehiscence. Prolonged labor (>12 hours) and emergency caesarean sections (60%) were identified as independent risk factors ($p < 0.01$). Chorioamnionitis was present in 18% of cases, contributing to infection-related wound breakdown. The use of vertical midline incisions (22%) and increased intraoperative blood loss were significantly associated with dehiscence. Patients with inadequate postoperative wound care and early mobilization had a higher risk of wound complications.

Conclusion: Wound dehiscence following caesarean section is influenced by multiple risk factors, including obesity, diabetes, anemia, prolonged labor, emergency surgeries, and surgical technique. Optimizing maternal health, improving intraoperative hemostasis, and ensuring adequate postoperative wound care can significantly reduce the incidence of wound complications. Preventive strategies, including better glycemic control, nutritional support, and the use of standardized surgical techniques, are essential in improving maternal surgical outcomes in caesarean deliveries.

Keywords: Wound Dehiscence, Caesarean Section, Risk Factors, Obesity, Diabetes, Anemia, Prolonged Labor, Surgical Technique, Wound Infection, Maternal Health, Postoperative Complications

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Introduction

Wound dehiscence following caesarean section is a major postoperative complication that leads to increased maternal morbidity, prolonged hospitalization, higher healthcare costs, and significant emotional distress for patients. It is defined as the partial or complete separation of the surgical incision, often accompanied by signs of infection, serous or purulent discharge, or gaping of the wound. Wound dehiscence can occur due to multiple factors, including maternal comorbidities, surgical techniques, intraoperative blood loss, and improper postoperative wound care [1]. The impact of wound dehiscence extends beyond the immediate postoperative period, increasing the risk of secondary infections, delayed wound healing, and, in severe cases, the need for secondary surgical interventions. Understanding the risk factors associated with wound dehiscence is essential for early identification, preventive measures, and improved clinical outcomes [2].

Several maternal factors have been associated with an increased risk of wound dehiscence. Obesity is one of the most significant risk factors, as excessive subcutaneous fat reduces vascular supply to the wound site, delaying healing and increasing the risk of infection. Similarly, diabetes mellitus impairs collagen synthesis and leukocyte function, leading to poor wound healing and increased susceptibility to infections. Anemia, which is highly prevalent among pregnant women in resource-limited settings, affects tissue oxygenation and delays the healing process [3]. Additionally, malnutrition and protein deficiencies further compromise wound integrity and tissue regeneration.

Obstetric factors also play a crucial role in the development of wound dehiscence. Prolonged labor is associated with maternal exhaustion, dehydration, and increased risk of infection, particularly in cases where prolonged rupture of membranes leads to chorioamnionitis. Emergency caesarean sections performed under urgent conditions often result in increased intraoperative complications, including excessive blood loss, suboptimal surgical techniques, and prolonged operative time, all of which contribute to impaired wound healing [4]. The presence of chorioamnionitis, an intra-amniotic infection, has been linked to an increased risk of post-caesarean wound infections and subsequent dehiscence.

Surgical factors such as the choice of incision, suturing techniques, and intraoperative hemostasis also influence the risk of wound dehiscence. The transverse Pfannenstiel incision is generally preferred over the vertical midline incision due to its better cosmetic outcomes and lower risk of wound disruption. However, in emergency cases or patients with significant intra-abdominal adhesions, a

vertical midline incision may be necessary, which carries a higher risk of wound complications [5]. Poor hemostasis during surgery increases the likelihood of hematoma formation, which can delay wound healing and predispose to infection. The type of suturing material and technique used for fascial closure also plays a role in maintaining wound integrity, with continuous closure techniques showing better results in reducing wound dehiscence compared to interrupted sutures [6].

Postoperative factors such as early mobilization, wound care practices, and patient compliance with follow-up also influence the likelihood of wound dehiscence. Inadequate wound hygiene, failure to follow proper aseptic techniques, and delayed detection of wound infections contribute to poor healing outcomes. Infections remain one of the leading causes of wound dehiscence, particularly in settings with inadequate postoperative monitoring and antibiotic prophylaxis. Identification of high-risk patients and early intervention through optimized wound management can significantly reduce complications [7].

The burden of wound dehiscence is particularly significant in resource-limited settings such as Bihar, where maternal malnutrition, limited access to healthcare, and high rates of anemia and diabetes contribute to adverse surgical outcomes [8]. The study setting, Patna Medical College and Hospital, is a major tertiary care center catering to a large population, making it an ideal location to evaluate the risk factors associated with wound dehiscence following caesarean sections. Understanding these risk factors will help in formulating targeted interventions to improve surgical outcomes, reduce maternal morbidity, and enhance postoperative care strategies [9].

This study aims to identify the risk factors contributing to wound dehiscence following caesarean sections and to evaluate the impact of maternal comorbidities, surgical techniques, and postoperative wound care on healing outcomes. By analyzing these factors, this research seeks to provide evidence-based recommendations to improve perioperative management and reduce the incidence of wound dehiscence in post-caesarean patients.

Methodology

This prospective observational study was conducted at the Department of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna, Bihar, India, over a period of twelve months. The study aimed to evaluate the risk factors associated with wound dehiscence following caesarean sections, with a focus on maternal comorbidities, surgical techniques, and postoperative wound care. A total of

one hundred and twenty post-caesarean patients who developed wound dehiscence were included as cases, and they were compared with one hundred and twenty matched controls who had uneventful wound healing. The selection of controls was done using a matched approach based on age, parity, and gestational age at delivery.

All patients undergoing caesarean section, either elective or emergency, during the study period were screened for eligibility. Inclusion criteria included women who underwent lower segment caesarean section and developed wound dehiscence during the postoperative period. Exclusion criteria included patients with known immune-compromised states such as HIV, those with previous history of major abdominal surgery leading to adhesions, or those who developed non-infective wound complications such as hematomas without dehiscence. Patients who were lost to follow-up within seven days of surgery were also excluded.

All caesarean sections were performed using a standardized surgical protocol under spinal or general anesthesia. The type of incision, duration of surgery, estimated blood loss, intraoperative antibiotic use, and presence of complications such as intraoperative hemorrhage was recorded. Patients were monitored postoperatively for signs of wound dehiscence, which was defined as partial or complete separation of the surgical incision with or without signs of infection, including serous or purulent discharge, erythema, and tenderness around the wound.

Patient demographics, including age, parity, body mass index, pre-existing medical conditions such as diabetes mellitus, hypertension, and anemia, and preoperative hemoglobin levels were recorded. Obstetric parameters, including duration of labor, premature rupture of membranes, chorioamnionitis, and fetal distress leading to emergency caesarean section, were also documented. Postoperative care factors, including antibiotic prophylaxis, wound care practices, and early ambulation, were assessed.

Wound dehiscence was classified based on severity as mild (involving superficial skin layers), moderate (extending to the subcutaneous tissue), and severe (involving fascial separation requiring resuturing). Patients were managed based on the severity of dehiscence, with conservative treatment in cases with minimal separation and resuturing performed in cases with extensive tissue disruption.

Statistical analysis was performed using SPSS version 25.0. Continuous variables such as age, BMI, duration of labor, and estimated blood loss were expressed as mean $\pm$ standard deviation and compared using an independent t-test. Categorical variables such as the presence of comorbidities, type of incision, and use of intraoperative antibiotics were analyzed using the chi-square test. Logistic regression analysis was performed to determine independent predictors of wound dehiscence, adjusting for potential confounders. A p-value of less than 0.05 was considered statistically significant.

Results

This study analyzed a total of one hundred and twenty post-caesarean patients who developed wound dehiscence and compared them with one hundred and twenty matched controls with uneventful wound healing. The findings provide insights into the demographic distribution, maternal comorbidities, obstetric risk factors, surgical variables, and postoperative wound management that influenced the incidence of wound dehiscence following caesarean section at the Department of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna, Bihar, India.

Table 1 presents the baseline demographic characteristics of the study population. The mean age was comparable between cases and controls, with no significant difference in parity. However, patients with wound dehiscence had significantly higher body mass index (BMI), with a greater proportion of obese patients in the dehiscence group.

Table 1: Baseline Demographic Characteristics

Characteristics	Cases (n=120)	Controls (n=120)	p-value
Mean Age (years)	29.8 $\pm$ 5.6	30.1 $\pm$ 5.2	0.62
Primigravida (%)	42 (35%)	40 (33%)	0.72
Multigravida (%)	78 (65%)	80 (67%)	0.68
BMI > 30 (kg/m ²)	38 (32%)	14 (12%)	<0.001

Table 2 highlights the presence of maternal comorbidities in the study population. Diabetes mellitus, hypertension, and anemia were

significantly more prevalent among patients with wound dehiscence compared to controls.

Table 2: Maternal Comorbidities and Risk Factors

Risk Factor	Cases (n=120)	Controls (n=120)	p-value
Diabetes Mellitus	29 (24%)	11 (9%)	<0.01
Hypertension	18 (15%)	10 (8%)	0.04
Anemia (Hb < 10 g/dL)	43 (36%)	20 (17%)	<0.001

Table 3 compares obstetric risk factors between cases and controls. Prolonged labor and premature

rupture of membranes were significantly associated with wound dehiscence.

Table 3: Obstetric Risk Factors

Variable	Cases (n=120)	Controls (n=120)	p-value
Prolonged Labor >12 hours	41 (34%)	18 (15%)	<0.001
Premature Rupture of Membranes >18 hours	25 (21%)	10 (8%)	<0.01
Chorioamnionitis	22 (18%)	7 (6%)	<0.01
Emergency Caesarean Section	72 (60%)	44 (37%)	<0.01

Table 4 outlines intraoperative variables. Vertical midline incisions, longer operative duration, and

excessive blood loss were significantly associated with wound dehiscence.

Table 4: Intraoperative Factors and Surgical Techniques

Parameter	Cases (n=120)	Controls (n=120)	p-value
Vertical Midline Incision	26 (22%)	9 (7%)	<0.01
Surgery Duration >60 min	40 (33%)	18 (15%)	<0.001
Intraoperative Blood Loss >500 mL	28 (23%)	12 (10%)	<0.01

Table 5 compares postoperative wound management practices and their impact on wound dehiscence. Inadequate postoperative wound care and delayed

dressing change contributed to higher wound complications.

Table 5: Postoperative Wound Care Practices and Complications

Postoperative Variable	Cases (n=120)	Controls (n=120)	p-value
Inadequate Wound Care	32 (27%)	14 (12%)	<0.01
Early Ambulation	40 (33%)	66 (55%)	<0.01
Antibiotic Use >48 Hours	22 (18%)	10 (8%)	0.02

Table 6 highlights the severity and classification of wound dehiscence among the cases.

Table 6: Severity and Classification of Wound Dehiscence

Severity Grade	Frequency (n=120)	Percentage (%)
Mild (Superficial Skin Separation)	52	43%
Moderate (Subcutaneous Tissue Exposure)	42	35%
Severe (Fascial Dehiscence Requiring Resuturing)	26	22%

Table 7 summarizes the management approaches employed for wound dehiscence cases.

Table 7: Management and Intervention Strategies

Management Approach	Frequency (n=120)	Percentage (%)
Conservative (Dressing and Antibiotics)	72	60%
Secondary Suturing	34	28%
Surgical Debridement	14	12%

Table 8 compares the length of hospital stay among cases and controls.

Table 8: Length of Hospital Stay

Parameter	Cases (n=120)	Controls (n=120)	p-value
Mean Hospital Stay (days)	7.8 ± 2.4	3.2 ± 1.5	<0.001

Table 9 highlights the overall wound infection rate in both groups.

Table 9: Wound Infection Rates

Infection Parameter	Cases (n=120)	Controls (n=120)	p-value
Wound Infection	82 (68%)	28 (23%)	<0.001

Table 10 summarizes the long-term maternal outcomes associated with wound dehiscence.

Table 10: Long-Term Maternal Complications

Complication	Cases (n=120)	Controls (n=120)	p-value
Chronic Pain	28 (23%)	10 (8%)	<0.01
Persistent Scar Issues	32 (27%)	18 (15%)	<0.01

The results of this study indicate that wound dehiscence following caesarean section is significantly associated with maternal comorbidities such as obesity, diabetes, and anemia, as well as obstetric and surgical risk factors like prolonged labor, emergency caesarean section, excessive intraoperative blood loss, and inadequate postoperative wound care. Patients who underwent vertical midline incisions and those with delayed ambulation had a higher risk of wound complications. The majority of wound dehiscence cases were managed conservatively, but a substantial proportion required secondary suturing or surgical debridement. The study highlights the need for improved maternal health optimization, surgical precautions, and adherence to standardized wound care protocols to minimize the risk of wound dehiscence.

Discussion

Wound dehiscence following caesarean section remains a significant postoperative complication that contributes to increased maternal morbidity, prolonged hospital stays, and higher healthcare costs. This study, conducted at the Department of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna, Bihar, India, provides critical insights into the various risk factors associated with wound dehiscence. The findings underscore the multifactorial nature of wound complications, with maternal comorbidities, obstetric conditions, surgical techniques, and postoperative wound care all playing a crucial role [10].

One of the key findings of this study was the significant association between obesity and wound dehiscence. A higher body mass index (BMI > 30 kg/m²) was observed in 32% of cases, compared to only 12% in the control group [11]. This aligns with existing literature indicating that obesity predisposes patients to impaired wound healing due to poor vascular supply to adipose tissue, increased mechanical stress on the wound, and a higher risk of postoperative infections. Adipose tissue has limited blood supply, making it more prone to ischemia and necrosis, which can delay healing and lead to wound breakdown. This finding emphasizes the need for weight optimization programs for high-risk pregnant women to minimize surgical complications [12].

Diabetes mellitus was another significant risk factor identified in this study, with 24% of wound dehiscence cases having diabetes compared to 9% in the control group. Diabetes impairs wound healing through multiple mechanisms, including reduced collagen synthesis, impaired leukocyte function, and microvascular complications [13]. Hyperglycemia creates a favorable environment for bacterial growth, further increasing the risk of surgical site infections. These findings reinforce the importance of strict glycemic control in diabetic pregnant women undergoing caesarean section, including preoperative screening, perioperative glucose management, and postoperative monitoring to prevent wound complications [14].

Anemia was prevalent in 36% of patients with wound dehiscence, significantly higher than in the control group (17%). Anemia leads to tissue hypoxia, impairing cellular metabolism and delaying the wound healing process. Poor oxygenation reduces fibroblast activity and collagen deposition, both of which are essential for wound integrity. Given the high prevalence of anemia among pregnant women in Bihar, routine screening and aggressive management of iron deficiency anemia before delivery should be prioritized to enhance postoperative recovery [15].

Obstetric factors such as prolonged labor and premature rupture of membranes were also significantly associated with wound dehiscence. Prolonged labor (>12 hours) was observed in 34% of cases, compared to 15% in the control group, while premature rupture of membranes (>18 hours) was present in 21% of cases. Both conditions increase the risk of chorioamnionitis, which was present in 18% of wound dehiscence cases. Chorioamnionitis, an intra-amniotic infection, contributes to a systemic inflammatory response, increasing the likelihood of postoperative infections and delayed wound healing [16]. Emergency caesarean sections accounted for 60% of wound dehiscence cases, compared to 37% in controls. The urgency of the procedure often results in increased blood loss, compromised aseptic precautions, and suboptimal wound closure, all of which can lead to wound breakdown. These findings highlight the need for careful intraoperative planning and the

judicious use of prophylactic antibiotics in high-risk patients [17].

Surgical techniques and intraoperative factors also played a crucial role in wound dehiscence. Vertical midline incisions were used in 22% of wound dehiscence cases compared to 7% in controls. While transverse Pfannenstiel incisions are generally preferred for their superior cosmetic outcomes and lower risk of wound complications, vertical midline incisions are sometimes necessary in emergency cases, particularly in patients with previous abdominal surgeries or significant adhesions [18]. However, they carry a higher risk of wound breakdown due to greater tissue tension and reduced wound perfusion. Intraoperative blood loss exceeding 500 mL was noted in 23% of wound dehiscence cases, which can contribute to tissue hypoxia and delayed wound healing. Prolonged operative time (>60 minutes) was another significant risk factor, observed in 33% of cases. Longer surgeries are associated with increased tissue handling, greater intraoperative contamination, and prolonged exposure to the operating room environment, increasing the risk of infection and delayed healing [19].

Postoperative wound care practices were also found to significantly impact wound healing outcomes. Inadequate wound care was reported in 27% of cases, compared to 12% in controls, suggesting that adherence to strict wound care protocols is essential for reducing complications. Early ambulation was observed in 33% of wound dehiscence cases, significantly lower than the 55% observed in controls. Early mobilization improves circulation, reduces venous stasis, and enhances tissue oxygenation, all of which contribute to better wound healing. Extended postoperative antibiotic use (>48 hours) was more common in wound dehiscence cases (18%) compared to controls (8%), possibly due to an increased incidence of surgical site infections requiring prolonged antibiotic therapy [20].

The severity of wound dehiscence varied, with 43% of cases classified as mild (superficial skin separation), 35% as moderate (subcutaneous tissue exposure), and 22% as severe (fascial dehiscence requiring resuturing). While the majority of cases were managed conservatively with dressing changes and antibiotics (60%), 28% required secondary suturing, and 12% required surgical debridement. These findings highlight the need for early detection and intervention in cases of wound dehiscence to prevent progression to severe complications requiring additional surgical management [21].

The length of hospital stay was significantly longer in wound dehiscence cases (mean of 7.8 days) compared to controls (3.2 days), demonstrating the economic and psychological burden associated with

postoperative wound complications. The wound infection rate was also markedly higher in the dehiscence group (68%) compared to controls (23%), further reinforcing the importance of infection prevention strategies, including strict aseptic surgical techniques, early identification of high-risk patients, and prompt postoperative wound surveillance [22].

Long-term maternal complications associated with wound dehiscence included persistent scar issues (27% vs. 15%) and chronic pain (23% vs. 8%). These findings emphasize the need for continued patient follow-up and counselling to address long-term wound healing concerns and improve overall maternal well-being.

Conclusion

This study highlights that wound dehiscence following caesarean section is influenced by multiple risk factors, including maternal comorbidities such as obesity, diabetes, and anemia, obstetric factors like prolonged labor and emergency caesarean sections, as well as surgical and postoperative wound care practices. Identifying high-risk patients preoperatively, optimizing maternal health, and adhering to standardized surgical techniques can significantly reduce the incidence of wound dehiscence. The findings suggest that improved intraoperative hemostasis, appropriate antibiotic prophylaxis, early mobilization, and strict postoperative wound care protocols are essential for minimizing wound-related complications.

Future research should focus on evaluating the long-term impact of wound dehiscence on maternal health, assessing the effectiveness of different wound closure techniques, and developing targeted interventions to improve wound healing outcomes in post-caesarean patients. Strengthening hospital-based infection control measures and promoting awareness among healthcare providers and patients about optimal wound care practices can further contribute to reducing wound complications and enhancing maternal surgical outcomes.

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