International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Researcher Article *DOI: 10.61336/im/26-06-83*

Association of Surgical Site Infections Following Caesarean Section with Maternal and Operative Risk Factors: A Descriptive Observational Study in a Tertiary Care Centre in Eastern India.

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Abstract

Background: Surgical site infection (SSI) remains one of the most common postoperative complications following caesarean section and contributes significantly to maternal morbidity, prolonged hospitalization, increased healthcare expenditure, and impaired postoperative recovery. Despite improvements in perioperative care and antibiotic prophylaxis, SSI continues to pose a major challenge in tertiary care institutions, particularly in resource-limited settings. The study evaluated maternal demographic factors, obstetric variables, operative characteristics, postoperative outcomes, microbiological profile, and serum procalcitonin levels among women undergoing caesarean section. SSI diagnosis was based on CDC criteria and patients were followed during the postoperative period for wound-related complications. The incidence of SSI was considerably associated with abnormal BMI, rupture of membranes, maternal medical comorbidities, immunocompromised status, prolonged operative duration, and pre-existing skin infection. Women with SSI demonstrated significantly elevated procalcitonin levels, higher ASEPSIS wound scores, and prolonged hospital stay. Early identification of high-risk women, optimization of maternal comorbidities, strict perioperative asepsis, rational antibiotic strategies, and enhanced postoperative surveillance are essential for reducing postoperative wound infection following caesarean section. Surgical site infection (SSI) remains one of the most common postoperative complications following caesarean section and contributes significantly to maternal morbidity, prolonged hospitalization, increased healthcare expenditure, and impaired postoperative recovery. Despite improvements in perioperative care and antibiotic prophylaxis, SSI continues to pose a major challenge in tertiary care institutions, particularly in resource-limited settings. The study evaluated maternal demographic factors, obstetric variables, operative characteristics, postoperative outcomes, microbiological profile, and serum procalcitonin levels among women undergoing caesarean section. SSI diagnosis was based on CDC criteria and patients were followed during the postoperative period for wound-related complications. The incidence of SSI was considerably associated with abnormal BMI, rupture of membranes, maternal medical comorbidities, immunocompromised status, prolonged operative duration, and pre-existing skin infection. Women with SSI demonstrated significantly elevated procalcitonin levels, higher ASEPSIS wound scores, and prolonged hospital stay. Early identification of high-risk women, optimization of maternal comorbidities, strict perioperative asepsis, rational antibiotic strategies, and enhanced postoperative surveillance are essential for reducing postoperative wound infection following caesarean section. ***Methods:*** A descriptive observational study was conducted among 142 women undergoing caesarean section in the Department of OBG at Medical College Kolkata. Maternal characteristics, operative findings, postoperative outcomes, wound cultures, and serum procalcitonin levels were analysed. ***Results:*** SSI developed in 28 women, yielding an incidence of 19.7%. Significant associations were observed with abnormal BMI, rupture of membranes, maternal comorbidities, and prolonged operative duration. Serum procalcitonin levels were significantly elevated among infected women. Conclusion: SSI following caesarean section remains highly prevalent in tertiary care institutions. Early risk identification, optimized perioperative care, and strict infection-control measures are essential to reduce postoperative morbidity.

Keywords: Surgical Site Infection (SSI), Caesarean Section, Maternal Morbidity, Postoperative Wound Infection, Risk Factors, Serum Procalcitonin, Microbiological Profile, Postoperative Outcomes, Obstetric Surgery, Tertiary Care Hospital.

Received: 06-05-2026
Revised: 18-05-2026
Accepted: 05-06-2026
Published: 13-06-2026

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INTRODUCTION

Surgical site infection following caesarean section is an important contributor to maternal morbidity worldwide and remains a significant public health challenge in developing countries. The increasing global rate of caesarean delivery has led to a parallel increase in postoperative infectious complications, resulting in increased burden on healthcare systems.

SSI following caesarean section can range from superficial wound infection to deep tissue involvement, wound dehiscence, pelvic abscess, septicemia, and prolonged hospitalization. Various maternal and operative risk factors have been implicated in the pathogenesis of postoperative wound infection, including obesity, anaemia, diabetes mellitus, hypertensive disorders, prolonged labour, rupture of membranes, prolonged surgery duration, excessive tissue handling, and poor nutritional status. In recent years, biomarkers such as serum procalcitonin have gained attention as potential tools for early identification of postoperative infections. Early diagnosis and timely intervention are essential to prevent severe morbidity and reduce healthcare expenditure.

The present study was therefore undertaken to evaluate the incidence, associated maternal and operative risk factors, microbiological profile, and postoperative outcomes of SSI following caesarean section in a tertiary care institution in Eastern India.

Caesarean section is among the most commonly performed obstetric surgical procedures worldwide. Despite advances in perioperative care, surgical site infection remains a major postoperative complication contributing significantly to maternal morbidity, prolonged hospitalization, increased healthcare costs, and severe infectious complications.

Multiple maternal, obstetric, and operative factors influence the development of SSI, including obesity, anemia, diabetes mellitus, prolonged labour, rupture of membranes, prolonged operative duration, and poor nutritional status. Emerging evidence also suggests an important role for biomarkers such as serum procalcitonin in early infection detection.

The present study aimed to evaluate the incidence, associated risk factors, microbiological patterns, and postoperative outcomes of SSI following caesarean section in a tertiary care centre in Eastern India.

MATERIALS AND METHODS

Study Design and Setting:

This hospital-based descriptive observational study was conducted in the Department of Obstetrics and Gynaecology, Medical College and Hospital, Kolkata over a period of 18 months.

Study Population:

A total of 142 women undergoing elective or emergency caesarean section were enrolled using systematic random sampling. Women developing postoperative wound complications during hospital stay were evaluated in detail.

Inclusion Criteria:

Women undergoing caesarean section who provided informed consent and fulfilled the study criteria were included.

Exclusion Criteria:

Women with incomplete clinical data, severe unrelated systemic illness, or refusal to participate were excluded from the study.

Data Collection:

Detailed demographic characteristics, obstetric history, parity, gravida, BMI, socioeconomic status, rupture of membranes, labour status, maternal comorbidities, operative findings, duration of surgery, suture materials, blood transfusion history, and postoperative complications were recorded using a structured proforma.

Laboratory Investigations:

Investigations included complete blood count, serum CRP, serum procalcitonin, wound swab culture, and antibiotic sensitivity testing. Wound infection was diagnosed according to CDC criteria.

Statistical Analysis:

Data analysis was performed using SPSS version 25. Chi-square test and Student's t-test were applied where appropriate. A p-value <0.05 was considered statistically significant.

Ethical Consideration:

Institutional Ethics Committee approval and informed consent were obtained prior to enrolment.

This hospital-based descriptive observational study was conducted in the Department of Obstetrics and Gynaecology, Medical College and Hospital, Kolkata over 18 months.

A total of 142 women undergoing elective or emergency caesarean section were enrolled using systematic random sampling. Detailed demographic, obstetric, operative, and postoperative variables were recorded. SSI diagnosis was based on CDC criteria.

Investigations included complete blood count, CRP, serum procalcitonin, wound swab culture, and antibiotic sensitivity testing.

Statistical analysis was performed using SPSS version 25. Chi-square test and Student's t-test were applied where appropriate. A p-value <0.05 was considered statistically significant. Institutional Ethics Committee approval and informed consent were obtained prior to enrolment.

RESULTS

The overall incidence of SSI following caesarean section was 19.7%. The majority of women belonged to the younger reproductive age group and were primigravida or nulliparous. Abnormal BMI demonstrated one of the strongest associations with postoperative infection, with markedly elevated SSI rates among obese and underweight women.

Maternal medical disorders including anaemia, diabetes mellitus, hypertensive disorders, and immunocompromised status significantly increased postoperative wound infection rates. Rupture of membranes prior to surgery and prolonged operative duration were also strongly associated with SSI.

Escherichia coli was the most commonly isolated organism followed by Staphylococcus aureus, reflecting the polymicrobial nature of post-caesarean wound infection. Most infections were superficial wound infections, while deep wound abscesses were relatively uncommon.

Women who developed SSI demonstrated significantly elevated serum procalcitonin levels and higher ASEPSIS wound scores compared with non-infected women. Hospital stay was also significantly prolonged among infected women, indicating increased healthcare burden and postoperative morbidity.

The overall incidence of SSI was 19.7%. BMI showed a strong association with SSI, with significantly higher infection rates among obese and underweight women. Rupture of membranes prior to surgery significantly increased infection risk. Maternal comorbidities including anemia, diabetes mellitus, hypertensive disorders, and immunocompromised states significantly increased postoperative infection rates. Prolonged operative duration also showed a strong association with SSI.

Serum procalcitonin levels and ASEPSIS wound scores were significantly elevated among infected women. Women with SSI required prolonged hospitalization compared to non-infected women.

TABLES

Table 1

Age Group (years)	Frequency	Percentage (%)
18–25	73	51.4%
26–30	52	36.6%
31–35	14	9.9%
>35	3	2.1%
Mean ± SD	26.67 ± 4.17	—

Interpretation: More than half (51.4%) of the participants belonged to the 18–25 year age group, reflecting the typical demographic of obstetric patients attending tertiary government facilities where early childbearing remains common. Only 2.1% of women were above 35 years, indicating that advanced maternal age was relatively uncommon in this cohort. Maternal age did not show any statistically significant correlation with SSI risk.

Table 2

Gravida	Frequency	Percentage (%)
G1	66	46.5%
G2	58	40.8%
G3	13	9.2%
G4	3	2.1%
G6	1	0.7%
G7	1	0.7%
Total	142	100.0%

Interpretation: Primigravida women constituted 46.5% of the study population, reflecting the high frequency of primary caesarean section in first pregnancies. Gravida status did not demonstrate a statistically significant relationship with SSI.

Table 3

Parity	Frequency	Percentage (%)	SSI Present	SSI Rate (%)
P0	82	57.7%	12	14.6%
P1	51	35.9%	15	29.4%
P2	8	5.6%	1	12.5%
P3	1	0.7%	0	0.0%
Total	142	100.0%	28	19.7%

Interpretation: Nulliparous women formed the majority of the cohort. Although the SSI rate was relatively higher among para-one women, the association was not statistically significant, suggesting that parity alone does not independently influence postoperative wound infection risk.

Table 4

BMI Category	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
Underweight	8	5.6%	6	75.0%	58.373	0.001
Normal	123	86.6%	12	9.8%	(df=2)	
Obese	11	7.7%	10	90.9%		
Total	142	100.0%	28	19.7%		

Interpretation: BMI showed a highly significant association with SSI. Both underweight and obese women demonstrated markedly elevated infection rates compared with women having normal BMI, demonstrating a U-shaped association between nutritional status and infection risk.

Table 5

SES Class	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
Lower (Class V)	88	62.0%	6	6.8%	38.895	0.007
Lower Middle	39	27.5%	11	28.2%	(df=3)	
Middle	9	6.3%	6	66.7%		
Upper Middle	6	4.2%	5	83.3%		
Total	142	100.0%	28	19.7%		

Interpretation: Most women belonged to the lower socioeconomic class. Socioeconomic status demonstrated significant association with SSI, likely reflecting variations in nutrition, healthcare access, comorbidities, and referral patterns.

Table 6

Gestation	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	p-value
Preterm (<37w)	21	14.8%	5	23.8%	0.610
Term (≥37w)	121	85.2%	23	19.0%	
Total	142	100.0%	28	19.7%	

Interpretation: Most women delivered at term gestation. Period of gestation did not show statistically significant association with SSI, indicating that gestational age alone may not independently influence postoperative wound infection.

Table 7

ROM Status	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
No	130	91.5%	21	16.2%	12.347	0.001
Yes	12	8.5%	7	58.3%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Rupture of membranes prior to surgery showed a highly significant association with SSI. Women with ruptured membranes had markedly increased infection rates due to probable ascending bacterial contamination.

Table 8

Labour Status	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	p-value
No	132	93.0%	26	19.7%	0.981
Yes	10	7.0%	2	20.0%	
Total	142	100.0%	28	19.7%	

Interpretation: Labour prior to caesarean section did not demonstrate significant association with SSI. Infection rates were similar among women with and without labour prior to surgery.

Table 9

Status	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
No	132	93.0%	23	17.4%	6.231	0.013
Yes	10	7.0%	5	50.0%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Immunocompromised status demonstrated statistically significant association with SSI. Women with impaired immune status had substantially higher postoperative infection rates.

Table 10

Comorbidity	Frequency	Percentage (%)
None	88	62.0%
Anaemia	16	11.3%
Diabetes Mellitus	14	9.9%
Pre-eclampsia	11	7.7%
Hypothyroidism	4	2.8%
Anaemia + Pre-eclampsia	2	1.4%
DM + Anaemia	2	1.4%
DM + Anaemia + Pre-eclampsia	3	2.1%
DM + Pre-eclampsia	1	0.7%
Anaemia + PE + Hypothyroidism	1	0.7%
Total	142	100.0%

Interpretation: Anaemia was the most common maternal comorbidity followed by diabetes mellitus and hypertensive disorders. The distribution highlights the high-risk obstetric profile managed in this tertiary care centre.

Table 11

Comorbidity	Total Cases	SSI Cases	SSI Rate (%)	Chi-square	p-value
Anaemia*	24	12	50.0%	52.136	<0.001
Diabetes**	20	11	55.0%	(df=9)	
Pre-eclampsia***	18	10	55.6%		
Hypothyroidism	6	2	33.3%		
No comorbidity	88	5	5.7%		

Interpretation: Maternal comorbidities demonstrated a very strong association with SSI. Women with anaemia, diabetes mellitus, pre-eclampsia, and combined disorders showed markedly elevated postoperative infection rates.

Table 12

Skin Infection	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
No	132	93.0%	20	15.2%	24.694	<0.001
Yes	10	7.0%	8	80.0%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Pre-existing skin infection showed highly significant association with SSI. Existing bacterial colonization likely contributed to postoperative wound contamination and poor wound healing.

Table 13

Type	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
Elective	4	2.8%	4	100.0%	16.758	0.001
Emergency	138	97.2%	24	17.4%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Emergency caesarean section constituted the majority of surgeries. Type of surgery demonstrated significant association with SSI, likely due to inadequate preparation time and increased contamination risk in emergency procedures.

Table 14

Skin Prep Done	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
No	110	77.5%	18	16.4%	3.470	0.062
Yes	32	22.5%	10	31.3%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Preoperative skin preparation did not demonstrate statistically significant association with SSI, although infection rates were relatively higher in women requiring additional preparation.

Table 15

Incision Type	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	p-value
Pfannenstiel	139	97.9%	27	19.4%	0.549
Longitudinal	3	2.1%	1	33.3%	
Total	142	100.0%	28	19.7%	

Interpretation: Pfannenstiel incision was the most commonly used surgical approach. Type of skin incision did not demonstrate statistically significant association with postoperative wound infection.

Table 16

Duration	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
<60 minutes	107	75.4%	13	12.1%	15.710	<0.001
≥60 minutes	35	24.6%	15	42.9%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Prolonged operative duration demonstrated highly significant association with SSI. Women undergoing surgery lasting 60 minutes or longer had substantially higher infection rates.

Table 17

Suture Material	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	p-value
Nylon 6	100	70.4%	21	21.0%	0.554
Polyglactin 910	42	29.6%	7	16.7%	
Total	142	100.0%	28	19.7%	

Interpretation: Type of suture material did not show statistically significant association with SSI. Infection rates were comparable between nylon and polyglactin sutures.

Table 18

Transfusion	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	p-value
No	125	88.0%	23	18.4%	0.284
Yes	17	12.0%	5	29.4%	
Total	142	100.0%	28	19.7%	

Interpretation: Blood transfusion did not demonstrate statistically significant association with SSI, although women requiring transfusion had relatively higher infection rates.

Table 19

Fever	Frequency	Percentage (%)	SSI Present	SSI Rate (%)	Chi-square	p-value
No	126	88.7%	22	17.5%	3.602	0.058
Yes	16	11.3%	6	37.5%	(df=1)	
Total	142	100.0%	28	19.7%		

Interpretation: Postoperative fever showed borderline statistical significance with SSI and may serve as an early clinical indicator of postoperative wound infection.

Table 20

Parameter	SSI Group (n=28)	No SSI Group (n=114)	t-value	p-value
Mean ± SD (ng/ml)	1.17 ± 0.75	0.05 ± 0.10	15.656	<0.001
Median (ng/ml)	1.04	0.04	—	—
Range (ng/ml)	0.15–2.40	0.01–0.85	—	—

Interpretation: Serum procalcitonin levels were significantly elevated among women who developed SSI, supporting its role as an early biomarker for postoperative infection detection.

Table 21

Statistic	All Participants (n=142)
Mean ± SD	0.27 ± 0.56 ng/ml
Median	0.04 ng/ml
Minimum	0.01 ng/ml
Maximum	2.40 ng/ml
25th Percentile	0.02 ng/ml
75th Percentile	0.05 ng/ml

Interpretation: Overall serum procalcitonin levels remained low in most participants, reflecting absence of infection in the majority of cases.

Table 22

Parameter	SSI Group (n=28)	No SSI Group (n=114)	t-value	p-value
Mean ± SD	26.50 ± 4.42	3.44 ± 3.86	27.513	<0.001
Median	26.0	2.0	—	—
Range	18–38	0–15	—	—

Interpretation: ASEPSIS wound scores were significantly higher among women with SSI compared with non-infected women, validating its usefulness in objective wound assessment.

Table 23

Statistic	All Participants (n=142)
Mean ± SD	7.99 ± 10.02
Median	4.00
Minimum	0
Maximum	38
25th Percentile	0
75th Percentile	11.00

Interpretation: Most participants demonstrated low ASEPSIS scores consistent with uncomplicated wound healing, while higher scores were predominantly confined to infected women.

Table 24

Parameter	SSI Group (n=28)	No SSI Group (n=114)	t-value	p-value
Mean ± SD (days)	16.93 ± 5.64	6.57 ± 1.76	16.734	<0.001
Median (days)	17.0	7.0	—	—
Range (days)	10–30	4–12	—	—

Interpretation: Women who developed SSI required significantly prolonged hospitalization compared with non-infected women, indicating substantial healthcare burden associated with postoperative infection.

Table 25

Statistic	All Participants (n=142)
Mean ± SD	8.61 ± 5.07 days
Median	7.00 days
Minimum	4 days
Maximum	30 days

Interpretation: The overall duration of hospital stay varied widely among participants, with prolonged admissions mainly occurring among women with postoperative complications.

Table 26

Organism Isolated	Frequency	Percentage of SSI Cases (%)	Percentage of Total Cohort (%)
Escherichia coli	18	64.2%	12.7%
Staphylococcus aureus	8	28.6%	5.6%
Enterococcus faecalis	1	3.6%	0.7%
MRSA	1	3.6%	0.7%
Total SSI Cases	28	100.0%	19.7%

Interpretation: Escherichia coli was the most commonly isolated organism followed by Staphylococcus aureus, reflecting the polymicrobial nature of post-caesarean wound infection.

Table 27

Outcome	Frequency	Percentage (%)
No SSI	114	80.3%
SSI Present	28	19.7%
Total	142	100.0%

Interpretation: The overall incidence of SSI in the study was 19.7%, indicating a relatively high burden of postoperative wound infection in this tertiary care setting.

Table 28

SSI Type	Frequency	Percentage of SSI Cases (%)
Superficial wound infection	26	92.9%
Deep wound abscess	2	7.1%
Total	28	100.0%

Interpretation: Most SSIs were superficial wound infections, while deep wound abscesses were relatively uncommon.

Table 29

Risk Factor	SSI Rate in Exposed	SSI Rate in Unexposed	Chi-square/t-value	p-value	Effect Size
BMI - Underweight	75.0%	9.8% (normal)	χ^2=58.373	<0.001	Very Strong
BMI - Obese	90.9%	9.8% (normal)	χ^2=58.373	<0.001	Very Strong
Socioeconomic Status	83.3% (upper-middle)	6.8% (lower)	χ^2=38.895	0.007	Strong
Rupture of Membranes	58.3%	16.2%	χ^2=12.347	0.001	Strong

Immunocompromised	50.0%	17.4%	χ^2=6.231	0.013	Moderate
Medical Comorbidities	55-56%*	5.7%	χ^2=52.136	<0.001	Very Strong
Pre-existing Skin Infection	80.0%	15.2%	χ^2=24.694	<0.001	Very Strong
Operation Duration ≥60 min	42.9%	12.1%	χ^2=15.710	<0.001	Strong
Type of Surgery (Elective)	100.0%**	17.4%	χ^2=16.758	0.001	NA***
Procalcitonin (Day 3)	1.17 ng/ml	0.05 ng/ml	t=15.656	<0.001	Very Strong
ASEPSIS Score	26.50	3.44	t=27.513	<0.001	Very Strong
Hospital Stay	16.93 days	6.57 days	t=16.734	<0.001	Very Strong

Interpretation: Abnormal BMI, rupture of membranes, maternal comorbidities, prolonged operative duration, elevated procalcitonin levels, and high ASEPSIS scores demonstrated the strongest association with SSI.

Table 30

Variable	p-value	Interpretation
Age	0.274	No association
Gravida	0.440	No association
Parity	0.181	No association
Period of Gestation	0.610	No association
Labour Prior to CS	0.981	No association
Type of Skin Incision	0.549	No association (limited by small sample)
Wound Closure Material	0.554	No association
Blood Transfusion	0.284	No association
Skin Preparation	0.062	Borderline (requires interpretation)
Postoperative Fever	0.058	Borderline significant

Interpretation: Variables such as age, gravida, parity, gestational age, incision type, suture material, and blood transfusion did not demonstrate statistically significant association with SSI.

Table 31

Risk Category	Criteria	Estimated SSI Risk	Management Implications
Low Risk	• Normal BMI • No comorbidities • No pre-existing infections • Intact membranes • Expected duration <60 min	5-10%	Standard prophylaxis and monitoring
Moderate Risk	• 1-2 risk factors present • Either BMI abnormal OR single comorbidity • Emergency surgery	20-40%	Enhanced prophylaxis, closer monitoring, consider PCT surveillance
High Risk	• ≥3 risk factors present • BMI extremes + comorbidities • Pre-existing infection • Membrane rupture + prolonged surgery	50-90%	Extended prophylaxis, intensive monitoring, mandatory PCT surveillance, delayed wound closure consideration

Interpretation: Risk stratification based on combined maternal and operative factors may help identify women at increased risk for postoperative SSI and guide enhanced surveillance and prophylaxis.

Table 32

Organism	Total Isolates	Commonly Sensitive To	Commonly Resistant To
E. coli (n=18)	64.2% of SSI	Gentamicin (94%) Ceftriaxone (89%) Piperacillin-Tazobactam (100%)	Ampicillin (67%) Cotrimoxazole (56%) First-gen cephalosporins (44%)
S. aureus (n=8)	28.6% of SSI	Vancomycin (100%) Linezolid (100%) Clindamycin (75%)	Penicillin (88%) Erythromycin (63%)
MRSA (n=1)	3.6% of SSI	Vancomycin Linezolid Teicoplanin	All beta-lactams

Interpretation: Antibiotic sensitivity patterns demonstrated good susceptibility to higher-generation antibiotics, while resistance to commonly used drugs emphasized the importance of culture-guided therapy.

DISCUSSION

The present study demonstrated a relatively high incidence of post-caesarean SSI compared with many international studies, likely reflecting the high patient load and referral burden encountered in tertiary government institutions. The findings highlight the major contribution of maternal nutritional status, operative factors, and medical comorbidities to postoperative wound infection.

Obesity and undernutrition emerged as important determinants of SSI, demonstrating the critical role of maternal nutritional optimization in reducing postoperative complications. Rupture of membranes prior to surgery significantly increased infection risk due to ascending bacterial contamination of the uterine cavity and operative field.

Maternal medical disorders such as diabetes mellitus, anaemia, hypertensive disorders, and immunocompromised status showed strong association with postoperative wound infection due to impaired tissue oxygenation, reduced immunity, and delayed wound healing.

The predominance of Escherichia coli and Staphylococcus aureus observed in the microbiological profile is comparable with findings from other obstetric SSI studies. The increasing emergence of resistant organisms highlights the importance of antibiotic stewardship and culture-guided therapy.

The significantly elevated serum procalcitonin levels among infected women support its utility as an early biomarker for postoperative infection severity assessment. Similarly, higher ASEPSIS wound scores among infected women validate its usefulness as an objective wound assessment tool.

The findings of the present study emphasize the importance of strict perioperative asepsis, optimization of maternal comorbidities, timely antibiotic prophylaxis, improved nutritional support, and enhanced postoperative surveillance in reducing SSI burden following caesarean section.

The present study demonstrated a relatively high incidence of post-caesarean surgical site infection compared to many international reports. The findings highlight the significant contribution of maternal nutritional status, operative factors, and pre-existing medical disorders to postoperative wound infection.

Obesity and undernutrition emerged as major determinants of SSI, demonstrating a U-shaped relationship between BMI and infection risk. Rupture of membranes prior to surgery significantly increased infection risk due to ascending bacterial contamination.

The elevated procalcitonin levels observed among infected women support its potential role as an early biomarker for postoperative infection severity assessment.

The findings emphasize the importance of perioperative optimization, antibiotic stewardship, strict asepsis, and institution-specific infection prevention strategies in reducing SSI burden.

CONCLUSION

Surgical site infection following caesarean section remains a significant contributor to maternal morbidity in tertiary care institutions and continues to increase the burden on healthcare systems through prolonged hospitalization, increased antibiotic use, repeated wound care procedures, and increased treatment costs. The present study identified abnormal BMI, rupture of membranes, maternal comorbidities such as anaemia, diabetes mellitus and hypertensive disorders, immunocompromised status, pre-existing skin infection, and prolonged operative duration as important determinants of postoperative wound infection. Women who developed SSI demonstrated significantly elevated serum procalcitonin levels and higher ASEPSIS wound scores, supporting the role of these parameters in early identification and objective assessment of postoperative wound infection severity.

Escherichia coli and Staphylococcus aureus were the predominant organisms isolated, highlighting the polymicrobial nature of post-caesarean wound infection and the importance of culture-guided antimicrobial therapy. The findings emphasize the importance of antenatal nutritional optimization, identification and treatment of maternal comorbidities, timely administration of appropriate antibiotic prophylaxis, strict adherence to perioperative aseptic protocols, minimization of operative duration whenever feasible, and enhanced postoperative wound surveillance. Early recognition of high-risk women and implementation of institution-specific infection prevention strategies may significantly reduce postoperative morbidity and improve maternal outcomes following caesarean section. Improved infection-control practices, nutritional optimization, timely antibiotic prophylaxis, and enhanced postoperative surveillance are essential to reduce postoperative wound infections and associated healthcare burden.

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