ORIGINAL RESEARCH

A Study of surgical site infection in patients undergoing caesarean section in GMC Jammu - infection rate and the common causative organisms

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ABSTRACT

Aim: A Study of surgical site infection in patients undergoing caesarean section in GMC Jammu - infection rate and the common causative organisms. **Material and methods:** This is a retrospective observational study in SMGS Jammu for a period of 2 years from july 2020 to june 2022. Patients undergoing cesarean sections with SSI during this period. **Results:** In the present investigation, a total of 800 instances of lower segment caesarean section (LSCS) were examined, revealing that 50 cases (6.25%) were afflicted with wound infection. The commonest clinical manifestation of SSI in our study was purulent discharge in 13 (26%) cases. Fever was present in 3(6%) cases. Local pain and induration was observed in 11 (22%) cases. 17 women (34%) had spontaneous superficial dehiscence wound and in 6 women (12%) wound was deliberately opened to facilitate drainage of pus. it was observed that bacterial growth was present in 78% of the cases, while the remaining 22% exhibited sterility in the cultures. Methicillin-resistant Staphylococcus aureus (MRSA) was identified as the most prevalent microorganism isolated from wound exudates. Escherichia coli and methicillin-resistant Staphylococcus aureus (MRSA) were among the frequently encountered microorganisms. **Conclusion:** A prevalence of 6.25% was observed for surgical site infection (SSI) subsequent to caesarean delivery, which represents a significant contributor to the overall burden of disease for both patients and the healthcare system.

Keywords: Surgical site infections, antibiotics prophylaxis, Cesarean delivery, wound culture

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INTRODUCTION

A caesarean section (CS) is a surgical procedure performed by making an incision through the mother's abdominal wall and underlying tissues in order to deliver the baby.(1) Among women in both developed and developing nations, caesarean section (CS) is the most frequently performed abdominal operation.(2) Adverse events, such as infection, postpartum haemorrhage, bladder injury, and increased risks during subsequent pregnancies, have also been observed following caesarean sections.Surgical site infection (SSI) subsequent to caesarean delivery has been found to result in prolonged patient hospitalisation, increased hospital expenses, and an elevated strain on our healthcare system.The occurrence of surgical site infections (SSI) following caesarean sections varies between 3% and 5%.(3)The occurrence rate of surgical site infections (SSI) following caesarean section (CS) is influenced by various factors, including wound class, maternal age, hypertensive disorders, types of CS procedures, number of vaginal examinations, high volume of blood loss during surgery, diabetes, maternal weight, surgical techniques, and premature rupture of membranes. The utilisation of prophylactic antibiotics in women undergoing caesarean section has the potential to decrease the occurrence of fever, endometritis, wound infection, urinary tract infection, and serious infection following the procedure.(4,5)

MATERIAL AND METHODS

This is a retrospective observational study in SMGS Jammu for a period of 2 years from july 2020 to june 2022.

INCLUSION CRITERIA

Patients undergoing cesarean sections with SSI during this period.

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EXCLUSION CRITERIA

Patients undergoing other surgeries other than cesarean and normal deliveries were excluded.

METHODOLOGY

All patients who underwent a lower segment caesarean section were administered a single dose of prophylactic antibiotic, specifically Inj. Cefotaxime 1 gm, 30 minutes before the surgical procedure. The preoperative skin preparation involved the use of a germicidal solution consisting of chlorhexidine gluconate and cetrimide, with a concentration of 3%. The skin was subsequently subjected to treatment using a solution of povidone iodine at a concentration of 10%.

During the postoperative period, all patients were administered intravenous cefotaxime at a dosage of 1 gm every 12 hours for a duration of 24 hours. Subsequently, they were transitioned to oral cefotaxime for the following 7 days. On the fourth day following the surgical procedure, the wound of each patient was assessed for the presence of discharge and indications of inflammation. Individuals exhibiting wound discharge were observed, and swabs were promptly collected on the same day for culture sensitivity testing. The patients were initiated on an alternative broad-spectrum antibiotic regimen, based on the results of culture sensitivity reports, in addition to receiving daily wound dressings.

The wounds exhibiting dehiscence were subsequently sutured following the observation of satisfactory granulation tissue.

The data collected encompassed comprehensive information regarding wound infections, including the identification of organisms cultivated in the cultures, the drug susceptibility of these organisms, and the identification of risk factors associated with infections. These risk factors encompassed obesity, premature rupture of the membranes (PROM), prolonged labour, and comorbid medical conditions such as diabetes, hypertension, and anaemia.

STATISTICAL ANALYSIS

Data analysis was done using SPSS 24.0. p value obtained by Pearson chi-square test were used for data analysis.

RESULT

During the designated study period, a total of 3877 deliveries were conducted at the hospital, with 800 of these deliveries being performed through the method of Lower Segment Caesarean Section (LSCS). A total of 800 instances of caesarean sections were conducted during the designated study duration.

Table 1: Type of LSCS and incidence of SSI

Type of LSCS	Total=800	SSI=50	%	P value
Elective	325	15	4.61	0.22
Emergency	475	35	7.37	

In the present investigation, a total of 800 instances of lower segment caesarean section (LSCS) were examined, revealing that 50 cases (6.25%) were afflicted with wound infection. Among the cohort of 50 patients diagnosed with surgical site infections (SSI), it was observed that 15 cases underwent elective surgical procedures, while the remaining 35 patients underwent emergency caesarean sections. The statistical significance of SSI in relation to the type of LSCS is not supported, as indicated by a p-value of 0.22.

Table 2: Risk factors for SSI Risk factors associated with SSI were evaluated and are summarized in following table.

Risk Factor	Number of cases	Percentage
Anaemia	12	24%
Post-partum Hemorrhage	3	6%
Blood transfusion	8	16%
Haematoma	2	4%
Obese	3	6%
Previous caesarean section	22	44%

The study conducted observed that the average duration of surgery for 659 cases of Lower Segment Caesarean Section (LSCS) was found to be less than one hour. The surgical procedure of 141 lower segment caesarean sections (LSCS) necessitated a duration exceeding one hour. The study revealed that an extended duration of surgery was identified as a significant contributing factor to surgical site infections (SSI).

Table 3: Clinical Presentation of SSI in LSCS

Clinical Presentation	Frequency	Percent
Fever	3	6%
Local pain and induration	11	22%

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Purulent discharge wound	13	26%
Spontaneous superficial dehiscence wound	17	34%
Wound deliberately opened	6	12%

SSI was detected on 5.5 days. The commonest clinical manifestation of SSI in our study was purulent discharge in 13 (26%) cases. Fever was present in 3(6%) cases. Local pain and induration was observed in 11 (22%) cases. 17 women (34%) had spontaneous superficial dehiscence wound and in 6 women (12%) wound was deliberately opened to facilitate drainage of pus. Rectus sheath dehiscence or pus collection in deeper tissues/ organs was not recorded in any patient.

Table 4: Pus Culture and Sensitivity

Type of Organism	Frequency	Percent
E. coli	5	10
MRSA	19	38
MRCON	6	12
Sterile	11	22
OTHERS	9	18

Samples of wound swabs were collected and subsequently analysed for the presence of aerobic and anaerobic microorganisms using culture and sensitivity testing methods. In the current investigation, it was observed that bacterial growth was present in 78% of the cases, while the remaining 22% exhibited sterility in the cultures. Methicillin-resistant Staphylococcus aureus (MRSA) was identified as the most prevalent microorganism isolated from wound exudates. Escherichia coli and methicillin-resistant Staphylococcus aureus (MRSA) were among the frequently encountered microorganisms. Eleven isolates exhibited no growth, suggesting the potential presence of a flawed suturing technique. Additional microorganisms that fall within this category encompass Streptococcus, Enterococcus, Candida albicans, Pseudomonas, and Acinetobacter.

The susceptibility of Methicillin-resistant Staphylococcus aureus (MRSA) was observed to be primarily towards Ciprofloxacin and Doxycycline. Escherichia coli, a type of Gram-negative bacterium, exhibited susceptibility to the antibiotics Amikacin and Gentamycin. The patient received daily application of a 10% betadine solution for dressing, along with antibiotic treatment based on the results of the culture sensitivity report.

Table 5: Management of SSI

Treatment		Percentage
Conservative treatment	35	70%
Resuturing	15	30%

Complete healing was noted with conservative treatment in 35 patients. Resuturing was needed in 15 cases. Patients without SSI were discharged on postoperative day 4.5 after check dressing. Patient with SSI needed prolonged hospital stay for daily dressing and /or antibiotics therapy. Patients who needed Resuturing needed hospital stay for average 15 days.

DISCUSSION

The incidence of surgical site infection (SSI) following caesarean section in our study was found to be 6.25%, a rate that is consistent with the 4.2% reported by Al Jama FE.(6) A research investigation conducted in Nigeria examined the incidence of surgical site infections (SSI) subsequent to caesarean sections (CS). The study findings revealed a cumulative wound complication rate of 13.5% and a specific SSI rate of 8.9%.(6) In their study of 1000 cases, K. Bhavani et al. (year) discovered that the incidence of surgical site infection (SSI) following lower segment caesarean section (LSCS) was 13.5%.(7)

In our study, the most prevalent high-risk factors identified were anaemia and a history of previous caesarean section. The study conducted by Bhavani et al. identified premature rupture of membranes, post-caesarean pregnancy in labour, and scar tenderness as risk factors. (7).

In a retrospective study conducted by Sobande et al., a cohort of 371 patients who underwent repeat caesarean section at King Khalid University in Saudi Arabia was examined. The study observed a wound dehiscence incidence rate of 4.12%. (8).

Killian et al. reported that surgical procedures lasting longer than one hour are associated with a greater than twofold increase in the risk of surgical site infections (SSI). Our study also observed a similar outcome (9). Surgical site infections (SSI) following caesarean delivery have a unique microbial origin, consisting of pathogens derived from both the skin and vaginal areas.(10) Methicillin-resistant Staphylococcus aureus (MRSA) was found to be the most prevalent pathogen responsible for surgical site infections (SSI) in our study, accounting for 37.5% of cases. Sterile culture, indicating the absence of identifiable pathogens, was observed in 21% of the cases. The escalation of methicillin-resistant Staphylococcus aureus (MRSA) within the selected cohort is a matter of significant apprehension. The co-occurring organisms identified in the study included Escherichia coli, methicillin-resistant coagulase-negative staphylococci

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(MRCONS), and Pseudomonas. The increasing incidence of surgical site infections may necessitate a modification in the administration of preoperative prophylactic antibiotics in the foreseeable future. In a study conducted by K. Bhavani et al., it was determined that the predominant pathogens identified were S. aureus, Pseudomonas aeruginosa, and E. coli, which aligns with the findings of their investigation.(7)In 21.4% of patients with surgical site infections (SSI), there was an absence of detectable organisms on culture. This finding suggests a necessity for more meticulous and accurate surgical techniques during primary closure.

The study conducted by Bhavani et al. revealed that a significant number of female patients experienced wound infections after being discharged.(7) These patients typically returned to the healthcare facility within a period of 6-10 days, reporting symptoms such as fever, pain, wound discharge, and redness. In the present investigation, surgical site infection (SSI) was observed to occur over a mean duration of 5.5 days. Additionally, it was found that approximately 34% of patients experienced spontaneous superficial wound dehiscence.

The treatment of post caesarean wound infection encompasses the administration of antibiotics, exploration of the wound, and debridement.(11)In our study, it was observed that 70% of patients with surgical site infections (SSI) were managed through conservative measures, while the remaining 30% of patients necessitated resuturing. A correlation was observed between an extended duration of hospitalisation and an escalation in healthcare expenditures in the context of Supplemental Security Income (SSI).

CONCLUSION

A prevalence of 6.25% was observed for surgical site infection (SSI) subsequent to caesarean delivery, which represents a significant contributor to the overall burden of disease for both patients and the healthcare system. This burden encompasses the adverse health outcomes experienced by patients as well as the associated economic costs. The incidence of surgical site infections (SSI) can potentially be reduced through the implementation of appropriate perioperative antibiotic administration, correction of anaemia, utilisation of proper surgical techniques, and minimising the duration of surgical procedures.

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