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Complications after lower segment caesarean section: Incidence, risk factors and management in India

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Abstract:

Lower Segment Caesarean Section is a common obstetric procedure, but post-operative complications remain a significant cause of maternal morbidity. Therefore, it is of interest to evaluate the incidence, determinants, spectrum and management of complications following LSCS in 300 patients at a tertiary care hospital. Hemorrhage, surgical site infection, urinary tract injury, thromboembolic events, post-operative fever and prolonged hospital stay were assessed. Risk factors including anemia, obesity, emergency LSCS, prolonged labor, premature rupture of membranes, previous caesarean section and medical comorbidities were analyzed. Thus, identifying modifiable risk factors and ensuring timely management may reduce post-operative morbidity and improve maternal outcomes after LSCS.

Keywords: Lower segment caesarean section, LSCS complications, maternal morbidity, surgical site infection, post-operative complications, obstetric surgery, determinants, management

Background:

The rate of caesarean section has increased significantly in the last few decades worldwide, with the World Health Organization (WHO) suggesting that the optimum rate is 10-15% but many developing and developed countries have reported rates much higher than this [1,2]. Although LSCS is considered a relatively safe surgical procedure, it is still associated with significant intraoperative and post-operative complications that contribute substantially to maternal morbidity, prolonged hospitalization, increased healthcare expenditure and occasionally maternal mortality [3, 4]. Complications following LSCS may range from minor wound infections and febrile morbidity to severe conditions such as postpartum hemorrhage, sepsis, thromboembolism, anesthetic complications, bladder injury, bowel injury, burst abdomen and need for hysterectomy [5]. The incidence and severity of these complications vary depending upon patient-related, obstetric, surgical and institutional factors. The increasing number of repeat caesarean sections has also contributed to an increased risk of operative complications and post-operative complications. Emergency LSCS is associated with a higher risk of complications than elective LSCS, as studies have shown that emergency LSCS is poorly prepared, associated with prolonged labor, fetal distress and maternal exhaustion [6]. Women who have had a previous LSCS are at increased risk of encountering adhesions, abnormal placentation, uterine scar dehiscence and placenta accrete spectrum disorders [7]. Anemia, obesity, diabetes mellitus, prolonged rupture of membranes, longer operative time and multiple vaginal examinations have been reported as important factors that contribute to increased post-operative infectious morbidity following LSCS, particularly in low and middle income countries where there are limitations in aseptic practices, delayed presentation, anemia, malnutrition and poor post-operative follow-up [8]. Surgical site infection (SSI) following LSCS is associated with increased pain, prolonged hospital stay, delayed wound healing, repeated dressings, resuturing and additional antibiotic therapy [9]. Another serious complication of LSCS is hemorrhage, which can happen intraoperatively or in

the post-operative period. Excessive blood loss during caesarean delivery can be caused by uterine atony, placental abnormalities, extension of uterine incision and coagulation disorders, which can lead to blood transfusion, intensive care unit admission and/or obstetric hysterectomy, causing maternal morbidity and mortality. Likewise, although less frequent, thromboembolic complications and anesthetic adverse events are significant causes of maternal complications after operative delivery [10, 11]. In recent years, interest has also been focused on the long-term complications of LSCS including the formation of isthmocele, chronic pelvic pain, infertility, menstrual irregularities and complications in subsequent pregnancies; therefore, it is important to understand the incidence and determinants of these complications to develop preventive strategies improve perioperative management and optimize maternal healthcare services [12]. The management of complications associated with LSCS includes early diagnosis, timely medical/surgical intervention, antibiotic stewardship, adequate blood transfusion support and strict post-operative monitoring. The use of standard surgical procedures, prophylactic antibiotics, appropriate aseptic measures and optimizing maternal health prior to surgery can significantly decrease post-operative morbidity [13]. Therefore, it is of interest to determine the incidence and factors associated with complications after LSCS and to see how they are managed in the patients admitted to tertiary care hospital.

Materials and Methodology:

The present study was conducted in the Department of Obstetrics and Gynecology of a tertiary care teaching hospital over a period of one year. The study was designed as a hospital-based prospective observational study aimed at evaluating the frequency, determinants, pattern and management outcomes of complications following Lower Segment Caesarean Section (LSCS).

Study design:

Prospective observational study

Study setting:

The study was carried out in the Department of Obstetrics and Gynecology at a tertiary care hospital catering to both urban and rural populations. The institution receives a large number of emergency referrals and high-risk obstetric cases from peripheral health centres.

Study duration:

The duration of the study was 12 months.

Study population:

All women undergoing Lower Segment Caesarean Section during the study period and fulfilling the inclusion criteria were considered eligible for participation.

Sample size:

A total of 300 patients who underwent LSCS were included in the study.

Sampling technique:

Consecutive sampling method was used. All eligible patients admitted during the study period were enrolled until the desired sample size was achieved.

Inclusion criteria:

- [1] Women undergoing elective or emergency LSCS
- [2] Singleton or multiple pregnancies
- [3] Women willing to participate in the study
- [4] Age group between 18 and 40 years

Exclusion criteria:

- [1] Women with severe pre-existing medical illness unrelated to pregnancy
- [2] Patients undergoing cesarean hysterectomy for gynecological indications
- [3] Patients unwilling to participate
- [4] Incomplete medical records or loss to follow-up during post-operative assessment

Data collection:

After obtaining institutional ethical committee approval and informed written consent, detailed demographic and clinical data were collected using a structured proforma. Information regarding maternal age, parity, gestational age, socioeconomic status, booking status, indication for LSCS, previous LSCS, associated comorbidities, and duration of labor, rupture of membranes, anemia, obesity, diabetes mellitus, hypertension, operative duration and intraoperative findings was recorded.

All patients were followed during the intraoperative and post-operative periods until discharge. Patients were monitored for development of complications such as:

- [1] Postpartum hemorrhage (PPH)
- [2] Surgical site infection (SSI)
- [3] Febrile morbidity
- [4] Urinary tract infection

- [5] Wound dehiscence
- [6] Bladder injury
- [7] Need for blood transfusion
- [8] Thromboembolic complications
- [9] Prolonged hospitalization
- [10] Maternal ICU admission

The management modalities used for each complication including antibiotics, blood transfusion, resuturing, drainage procedures, ICU care and surgical interventions were documented.

Outcome measures:**Primary outcome**

- [1] Incidence of complications following LSCS

Secondary outcomes

- [2] Determinants associated with post-operative complications
- [3] Pattern of maternal morbidity
- [4] Management outcomes of complications

Statistical analysis:

Data were entered in Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Categorical variables were expressed as frequency and percentage. Continuous variables were expressed as mean $\pm$ standard deviation. The Chi-square test and Fisher's exact test were used for comparison of categorical variables. A p-value less than 0.05 were considered statistically significant.

Results:

A total of 300 women who underwent Lower Segment Caesarean Section were included in the study. The incidence, determinants, spectrum and management of complications were analyzed in detail. The majority of patients belonged to the age group of 21–30 years. Emergency LSCS constituted a major proportion of the procedures. Overall post-operative complications were observed in 92 patients, giving an incidence rate of 30.7%. Among the 300 patients studied, the majority (66%) belonged to the age group of 21–30 years, reflecting the common reproductive age group undergoing LSCS. Emergency procedures accounted for 64% of cases, indicating the high burden of urgent obstetric interventions in tertiary care centres. Anemia was observed in 39.3% of patients and emerged as one of the most common associated comorbid conditions. Previous LSCS was present in 32% of women, highlighting the increasing trend of repeat cesarean deliveries (**Table 1**). The overall incidence of complications following LSCS was 30.7%. Postpartum haemorrhage was the most frequent complication (9.3%), followed closely by surgical site infection (8%). Blood transfusion was required in 10% of patients, indicating significant perioperative blood loss in a substantial proportion of women. Prolonged hospitalization was noted in 14% of cases, mainly secondary to infection, anemia and wound-related complications (**Table 2**). Emergency LSCS showed a statistically significant association with post-operative complications

($p=0.001$). Anemia emerged as a major determinant, being present in 58.7% of women with complications compared to 30.8% without complications. Obesity, diabetes mellitus, prolonged labor and previous LSCS were also significantly associated with increased maternal morbidity following cesarean delivery (**Table 3**). The findings suggest that optimization of maternal health before surgery and timely obstetric intervention may substantially reduce post-operative complications. Management of complications was individualized according to severity. Patients with postpartum haemorrhage were managed with uterotonics, blood transfusion and surgical hemostatic procedures when necessary. Surgical site infections were treated using culture-sensitive antibiotics, wound drainage and regular dressings. Cases with wound dehiscence required secondary suturing. Bladder injuries were recognized intraoperatively and repaired immediately with post-operative catheterization. Patients requiring ICU care were managed with multidisciplinary support including anaesthesiologists, physicians and intensivists overall maternal outcome was satisfactory in the majority of cases due to early diagnosis and prompt management. No maternal mortality was observed during the study period.

Table 1: Demographic and obstetric characteristics of study population (n=300)

Variables	Number	Percentage
Age 18–20 years	42	14.0%
Age 21–30 years	198	66.0%
Age >30 years	60	20.0%
Primigravida	164	54.7%
Multigravida	136	45.3%
Elective LSCS	108	36.0%
Emergency LSCS	192	64.0%
Previous LSCS	96	32.0%
Anemia present	118	39.3%
Hypertension	52	17.3%
Diabetes mellitus	34	11.3%
Obesity	48	16.0%

Table 2: Incidence and pattern of complications following LSCS

Complication	Number	Percentage
Postpartum hemorrhage	28	9.3%
Surgical site infection	24	8.0%
Febrile morbidity	18	6.0%
Urinary tract infection	10	3.3%
Wound dehiscence	6	2.0%
Bladder injury	3	1.0%
ICU admission	5	1.7%
Blood transfusion required	30	10.0%
Prolonged hospital stay	42	14.0%
Total patients with complications	92	30.7%

Table 3: Determinants associated with complications following LSCS

Determinants	Complications Present n=92	Complications Absent n=208	p-value
Emergency LSCS	74 (80.4%)	118 (56.7%)	0.001
Anemia	54 (58.7%)	64 (30.8%)	0.0004
Previous LSCS	40 (43.5%)	56 (26.9%)	0.008
Obesity	24 (26.1%)	24 (11.5%)	0.003
Diabetes mellitus	18 (19.6%)	16 (7.7%)	0.005
Prolonged labor	38 (41.3%)	42 (20.2%)	0.001

Discussion:

The LSCS has emerged as one of the most common obstetric surgical procedures in the world. The current study aimed to

assess the incidence, risk factors and complications of LSCS among 300 women who underwent cesarean section in a tertiary care hospital. Most of the patients in the present study were in the age group of 21-30 years which is similar to the observations made by Chaurasia and Shrivastava who observed that maximum cesarean deliveries were in women in the same age group. This is the time of maximum fertility of the general obstetric population. In the present study, emergency LSCS constituted 64%, similar to that reported by various tertiary care centres where emergency referrals and high-risk pregnancies are predominant. The overall incidence of complications in the present study was 30.7%. The differences in complication rates between studies could be due to differences in patient characteristics, institutional protocols, emergency referral patterns and peri- and post-operative care. In the present study, the most common complication was postpartum hemorrhage, which occurred in 9.3% of patients. The common causes of hemorrhage during cesarean section are uterine atony, prolonged labor, placenta previa, scarred uterus and extension of uterine incision. Despite the advances in obstetric management, postpartum hemorrhage is still a significant source of maternal morbidity and mortality globally and timely use of uterotonics, active management of third stage of labour and availability of blood products are crucial in preventing severe maternal outcomes, as stated by Escobar *et al.* [6]. In the present study, 8% of patients had surgical site infection. In the present study, obesity and diabetes mellitus were found to be statistically significant factors associated with post-operative morbidity, which is in line with the previous studies. Anemia was one of the most significant risk factors for complications. Anemia was the most common complication in over 50% of the women. Maternal anemia affects wound healing predisposes to infection and contributes to the need for blood transfusion during surgery. Patel *et al.* also found a high correlation between maternal anemia and infectious morbidity after surgery [10]. Emergency LSCS was found to be significantly associated with increased post-operative complications when compared to elective surgery. Women who need emergency procedures are at risk of long labour, fetal distress, obstructed labour or ruptured membranes, which can lead to greater intra-operative difficulty and post-operative morbidity. Sailakshmi and Vidhyadhare also observed greater maternal complications in emergency and second-stage cesarean sections due to technically challenging operative conditions [12]. Another important determinant in the current study that was associated with previous LSCS was post-operative complications. Multiple cesarean sections are associated with a higher risk of adhesions, scar separation, abnormal placentation, bladder damage and heavy bleeding. The risk of abnormal placentation and obstetric hysterectomy in subsequent pregnancies is significantly higher in women who have previously had a cesarean section, reports Shabnam *et al.* [14]. In the present study, 1% of patients had bladder injury. Although uncommon, urinary bladder injury remains an important surgical complication because of the close anatomical relationship between the bladder and lower uterine segment. Previous LSCS and dense adhesions are important risk factors

for bladder injury during cesarean section and early recognition and prompt surgical repair are essential to avoid long-term urological complications [15]. Long hospitalisation was noted in 14% of the patients, primarily for surgical site infection, anemia, wound complications and febrile morbidity. Adequate antibiotic prophylaxis, proper surgical technique, optimizing maternal nutrition and post-operative monitoring can significantly shorten hospital stay and recovery. The present study also emphasized the need for multidisciplinary management for better maternal outcomes. Complications were promptly recognised and managed on an individual basis, leading to good outcomes in most patients. Successful management was achieved through blood transfusion, antibiotic therapy, wound care and support in the intensive care unit (ICU). The same was seen in modern obstetric research that highlighted the importance of protocol-based perioperative management [6]. The results of the present study highlight the fact that there are multiple complications after LSCS which are preventable. In addition, enhancing institutional infection control measures and providing access to trained obstetricians can help to decrease the incidence of post-operative morbidity [1]. Finally, the implementation of evidence-based surgical guidelines and the avoidance of unnecessary primary cesarean sections are important for maternal safety. There are some limitations in the present study. The results of this study are limited to the population of the single center. Maternal complications after LSCS were not assessed. The study, however, offers a good insight into the incidence, determinants and management of post-operative complications in a tertiary care setting.

Conclusion:

The overall post-operative complication rate after LSCS was 30.7%, with postpartum hemorrhage and surgical site infection being the most common complications. Emergency LSCS, anemia, obesity, diabetes mellitus, prolonged labor and previous cesarean section were significant factors associated with

increased maternal morbidity. Early identification and optimization of high-risk women, strict aseptic practices, timely intervention and multidisciplinary care are essential to reduce post-operative complications.

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