

# Maternal Morbidity and Mortality in Higher Order Caesarean section

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## ABSTRACT

**Background:** The persistently rising cesarean section rate in Pakistan is largely driven by cultural preferences for larger families, primary cesarean sections, induction of labor, and the desire to avoid litigation. These practices have resulted in numerous complications, posing significant challenges for obstetricians worldwide. This study aimed to determine the maternal morbidity and mortality associated with multiple repeat cesarean sections.

**Methods:** This cross-sectional study was carried out at the Department of Gynecology and Obstetrics, at a tertiary care hospital, Abbottabad. Patients (106), with four or more previous cesarean sections, (elective or emergency repeat CS), over 6 months (October 2022 to March 2023), were selected. The primary outcome including uterine scar dehiscence (USD), scar rupture, bladder injury, bowel injury, grade 2 adhesions, morbidly adherent placenta (MAP), obstetrical hysterectomy, intensive care admission, blood transfusion, prolonged hospital admission, and maternal mortality, were recorded through follow-up four weeks postpartum. Data was analyzed using SPSS vr20.

**Results:** Cesareans performed were 798, and HOCS 106 (13.2%). Out of these, 95 (89.6%) had their fourth, 9(8.5%) fifth, and 2(1.8%) sixth CS. Abdominopelvic adhesions were seen in 53(50%), USD in 23(21.6%), MAP in 5.6% leading to obstetrical hysterectomy in 6(5.6%), bladder & bowel injury occur in 2(1.9%). No maternal death was recorded.

**Conclusion:** HOCS pose significant challenges. Reducing primary and elective repeat CS rates by promoting alternative delivery methods and trial of labor after one CS. Proper counseling and education on the risks of multiple cesarean sections and the use of modern contraceptive techniques are essential.

**Keywords:** Cesarean section, Morbidly Adherent Placenta, Obstetric Surgery.

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## INTRODUCTION

The increasing global rate of cesarean sections is associated with a parallel rise in maternal morbidity and mortality<sup>1</sup>. Approximately 15% of births worldwide are delivered by cesarean section, doubling the risk of maternal mortality and morbidity compared to vaginal delivery<sup>2,3</sup>. Higher-order cesarean sections (HOCS) are defined as the fourth or subsequent cesarean section. Managing the serious maternal complications of HOCS is one of the major challenges faced by obstetricians today<sup>4</sup>. Several factors contribute to the increased rates of cesarean delivery, including advancing maternal age, induction of Labor, declining rates of the trial of Labor after cesarean (TOLAC), lack of expertise in vaginal breech delivery, decreased use of operative vaginal delivery, patient requests, reluctance to attempt a trial of Labor, and concerns about litigation<sup>5</sup>.

The number of women requiring more than three cesarean sections is rapidly increasing, driven by relaxed indications for primary and secondary caesareans, including requests from mothers themselves. There is no absolute upper limit for the number of repeat cesarean sections, but the risk of serious maternal complications, such as abnormal placentation and morbidly adherent placenta (MAP), increases with the number of previous cesarean sections<sup>6</sup>. For instance, the risk of placenta previa increases from 10/1000 with one previous cesarean section to 28/1000 with three or more cesarean deliveries. Similarly, the risk of placenta previa accreta increases from 3.3%- 4% with no previous cesarean section to 50-67% with three or more cesarean births<sup>7</sup>.

Repeat cesarean sections also pose a significant risk of uterine rupture, particularly in cases with dense adhesions and extensive pelvic dissection<sup>7</sup>. These complications necessitate prolonged operative times, increased blood loss, blood transfusions, intensive care management, and, at times, cesarean hysterectomy. These statistics underscore the importance of reducing primary cesarean section rates and increasing the rate of TOLAC after one previous lower segment cesarean section<sup>8</sup>.

In developed countries, sterilization options are offered after the third delivery, but this approach is not applicable in countries like Pakistan, where large families are desired for cultural and religious reasons<sup>5,9</sup>. Attempting to limit cesarean deliveries to 2-3 is often rejected, leading to higher-order cesarean deliveries. The Combined Military Hospital Abbottabad is a tertiary care hospital that manages many high-risk patients referred from primary and secondary healthcare levels, as well as home deliveries and the private sector. However, data on maternal complications associated with

higher-order cesarean sections at the local level are limited. Addressing this issue and implementing measures to reduce maternal morbidity and mortality related to higher-order cesarean sections is imperative.

To contribute to knowledge development in this research area and pave the way for future studies in this field, provide recommendations to reduce their rising cesarean rates, and emphasize the importance of proper counseling and public health education for mothers undergoing higher-order repeat cesarean sections. The data was collected, processed, and analyzed to determine the complications associated with higher-order cesarean in our study. This study aimed to determine the maternal morbidity and mortality associated with multiple repeat cesarean sections.

## METHODS

In our cross-sectional study, 798 cesarean sections were done, out of them 106 patients were high order cesarean sections (four or more cesarean sections) at the Department of Obstetrics and Gynecology, Combined Military Hospital Abbottabad, from October 1, 2022, and March 31, 2023. Patients with a history of four or more cesarean sections were included in our study and those with classical cesarean sections, non-cesarean abdominal surgeries, previous one or more cesarean sections, and bleeding tendencies were excluded using convenience sampling from the study. The study received approval from the hospital's ethical committee (letter # CMH Atd-ETH-81-Gyane-23).

All higher-order cesarean sections were managed by a multidisciplinary team, including senior obstetricians, anesthetists, surgeons, and hematologists. For cases at high risk of bleeding, with morbidly adherent placenta, the availability of blood and blood products was ensured couple was counseled, and informed written consent was taken. Data were collected on a proforma, which included demographic factors and clinical information such as maternal age, parity, BMI, booking status, number of cesarean sections, nature of cesarean sections, and morbidity in previous surgeries, per operative findings including the presence of grade 2 abdominopelvic adhesions, uterine dehiscence or rupture, MAP, injury to bladder or bowel followed by repair, blood loss, involvement of general surgeon and urologist, uterine artery ligation, hysterectomy in case of intractable hemorrhage and operative time. Post-operative findings include intensive care admission, massive blood transfusion, prolonged catheterization, wound dehiscence, infection, prolonged hospital stay, and maternal death.

Data were entered and analyzed using SPSS version

20 for Windows. Numerical variables were presented as mean and SD while categorical values were presented as number and percentage. Student t-test was used for the analysis of qualitative data. The p-value of  $\leq 0.05$  was taken as statistically significant.

**RESULTS**

In this study, 106 females were booked for higher-order cesarean delivery. During the study period, the cesarean section rate at the hospital was 49.9%, with a HOCS rate of 13.2% per total cesarean sections. The demographic

characteristics of the females in our study are shown in Table 1. The mean age of the women was  $31.57 \pm 3.72$  years, with the majority 86(81.1%) falling in the 25-35 years age group. The mean parity of the females in the study was  $3.36 \pm 0.693$ , with the majority 79(74.5%) having a parity of four. Mean $\pm$ S.D for BMI was  $37.2 \pm 5.3$ , with 72 (69.7%) of the women having a normal weight, while 28(26.4%) were obese. Almost all of them 103(97.2%) were booked patients, and 95(89.6%) had undergone their fourth lower segment cesarean section (LSCS). Among this sample, 83(78.3%) of the females had elective LSCS and only 23(21.7%) had category 1 and 2 LSCS.

**Table 1: Demographic characteristics of female patients (n=106).**

Characteristics	n	%
<b>Age of the patients</b>		
Mean $\pm$ S.D	31.57+-3.72	
<25	3	2.8%
25-35	86	81.1%
>35	17	16.035%
<b>Parity of the patients</b>		
Mean $\pm$ S.D	3.36+-0.693	
4	79	74.5%
5	18	17.0%
6	7	6.6%
7	2	1.9%
<b>Body Mass Index (BMI)</b>		
Mean $\pm$ S.D	37.2 $\pm$ 5.3	
Normal weight	72	67.9 %
Overweight	6	5.7 %
Obese	28	26.4%
<b>Booking status</b>		
Booked	103	97.2%
Un booked	3	2.8 %
<b>Number of LSCS</b>		
4	95	89.6 %
5	9	8.5%
6	2	1.9%
<b>Elective LSCS</b>		
Yes	83	78.3%
No	23	21.7%
<b>Category 1 and 2 LSCS</b>		
Yes	23	21.7%
No	83	78.3%

LSCS: Lower Segment Caesarean Section

Perioperative maternal morbidity is shown in Table 2. Dense adhesions were found in 84.5%, 12.6%, and 2% of the patients undergone previous 4th, 5th, and 6th cesarean sections respectively. Uterine rupture was observed in 50% of the patients who underwent 5th and 6th cesarean sections. The most scar dehiscence was found in 25(73.5%) females who underwent 4th cesarean section with a p-value of

0.01. Injury to bladder and bowel is higher in higher order, almost 50% in each group. MAP was found in 10(71.4%) females of 4th cesarean section while 2(14.2%) in others with a p-value of 0.02. In terms of family planning, 37.7% of females opted for bilateral tubal ligation (BTL), and 17% chose postpartum intrauterine contraceptive devices (PPIUCD).

**Table 2: Perioperative maternal morbidity in high-order cesarean section.**

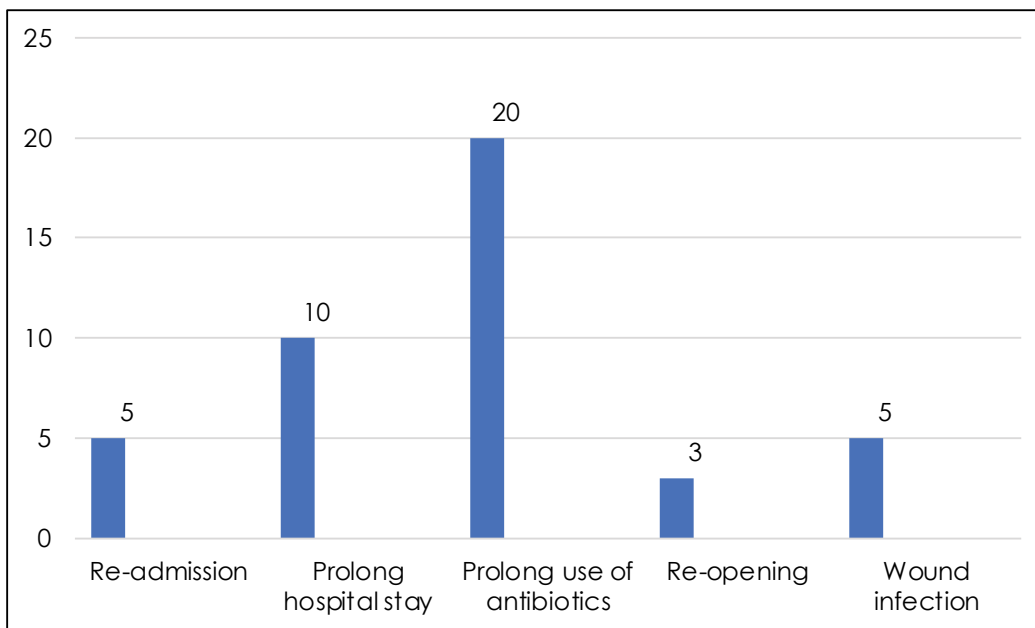
VARIABLES	HIGH ORDER CESAREAN SECTION N (%)				
	4 N=95	5 N=9	6 N=2	TOTAL	P -VALUE
PRESENCE OF GRADE -2 ABDOMINOPELVIC ADHESIONS	60 (84.5%)	9 (12.6%)	2 (2.8%)	71 (100%)	0.5
UTERINE RUPTURE	0 (0%)	1 (50%)	1 (50%)	2 (100%)	0.2

MAP	10(71.4%)	2(14.2%)	2(14.2%)	14(100%)	0.02
Obstetrical Hysterectomy	2 (33.3%)	2(33.3%)	2 (33.3%)	6(100%)	0.3
Blood Transfusion	70 (77.7%)	8(8.8%)	2 (2.2%)	90(100%)	0.4
Dehiscence	25 (73.5%)	7(20.5%)	2 (5.8%)	34(100%)	0.01
Injury to bladder or bowel followed by repair	0(0%)	1(50%)	1 (50%)	2(100%)	0.1
Uterine artery ligation	0 (0%)	0(0%)	0(0%)	0(100%)	0.5
Involvement of surgeon and urologist	3(75%)	1(25%)	0(0%)	4(100%)	0.28
Fused abdominal layers	35(77.7%)	8(17.7%)	2(4.4%)	45(100%)	0.8
Operative time	43.3min	55.6mon	59.0min	Mean±S.D 55.24±18.89	

MAP: Morbidly Adherent Placenta, p-value<0.05 is considered significant.

Regarding blood transfusion, 90 patients required it, as shown in Table 2. The mean operative time was  $55.24 \pm 18.89$  minutes. The magnitude of increased operative time was seen among junior obstetricians compared with senior obstetricians, and the mean hospital stay was  $3.55 \pm 1.61$  days. Maternal

complications are significantly high ( $p\text{-value} \leq 0.05$ ) in higher order cesarean section and postoperative complications were re-admission, hospital stay, prolonged treatment with antibiotics, and wound infections as shown in Figure 2.



**Figure 2: Post-operative maternal complications.**

## DISCUSSION

Obstetricians face increasing challenges when performing higher-order cesarean sections, primarily due to the presence of serious complications, such as dense adhesions and morbidly adherent placenta<sup>10</sup>. The leading indication for repeat cesarean sections is the presence of a previous scar, highlighting the need to reduce primary cesarean section rates<sup>24</sup>.

Globally, there is no set upper or lower limit for the number of cesarean sections due to sociocultural

differences. In developed countries, family size has been reduced to 2-3 through widespread family planning use, resulting in a reduction in cesarean sections to 2-3<sup>11,12</sup>. However, Pakistan, as a developing country, maintains a desire for large family sizes for various religious, cultural, and socioeconomic reasons, leading to an increase in repeat cesarean sections<sup>13</sup>. In this study, the total number of higher-order cesarean sections was 106, with a rate of 6.6% per total delivery and 13.2% per total 798 cesarean section. This is consistent with other local and international studies.

Despite the risks associated with multiple cesarean sections, women continue to have five or more children, with a mean parity of  $3.36 \pm 0.693$  in this study. This can partly be attributed to low contraceptive use in Pakistan. Younger females are also opting for repeat cesarean delivery, with a significant number falling within the 25-35 years age group<sup>14</sup>. The persistence of the concept of large family size, coupled with limited contraceptive use, suggests the need for public awareness campaigns and counseling for couples undergoing higher-order cesarean sections, allowing them to make informed choices<sup>15</sup>.

In this study, 97.2% of the patients were booked for elective cesarean sections, and 89.6% had undergone their fourth LSCS. Bilateral tubal ligation was performed in a lower number of patients after obtaining consent from the couples despite counseling them beforehand about the complication of HOCS (social taboo), which stresses the urgent need for education on family planning in the whole country at a national level<sup>16</sup>. Intraperitoneal adhesions (50%) increased with the increasing number of cesarean sections and fused abdominal layers (42.44%) consistent with a study conducted in Jazan Saudi Arabia<sup>18</sup>. Such adhesions result in difficulties in separating the lower uterine segment, leading to longer operative times Mean  $\pm$ SD  $55.24 \pm 18.89$  in our study, increased blood loss, requiring blood transfusions is (38.67%) in our study the same compared to the study done by Abbas et al<sup>17</sup>. This highlights the need for effective adhesion prevention measures and an efficient blood banking system, with blood availability ensured before cesarean section for these patients<sup>17</sup>. Bladder and bowel injuries are (1.88%) common in cases with  $\geq 5$  cesarean sections incidence is less as the majority of HOCS were done by senior obstetricians. Uterine rupture is another life-threatening complication, which occurs in (1.8%) even as asymptomatic scar dehiscence<sup>18,19</sup>. The thinning of the uterine wall at the scar site gradually increases with the number of cesarean sections. In this study, scar dehiscence occurred in (21.69%) even in the absence of labor pains, and rupture rates remained less, as reported in some other studies<sup>20</sup>.

Abnormal placentation and placental invasion of the uterus, leading to morbidly adherent placenta, are life-threatening obstetric complications<sup>18,20,24</sup>. The frequency is (5.6%) in this study. MAP was significantly higher among women with HOCS, and the risk increased from 0.6% with an unscarred uterus to 60% -70% for women with four or more previous cesarean sections<sup>21,22</sup>. The incidence of hysterectomy in cesarean deliveries complicated

by placental adherence is (5.7%), in line with the results of some other local studies. The length of surgery was dependent on the expertise of the surgeon and the presence of dense adhesions along with fused abdominal layers, in our study the duration of surgery ranges from 43.2 min to 59.0 mins. Multidisciplinary involvement was required in (3.7%). Patients who develop complications tend to have longer hospital stays, imposing an economic burden on limited healthcare resources. The mean hospital stay in this study was  $3.55 \pm 1.61$  days, consistent with another study where hospital stays were significantly longer in patients with higher-order cesarean sections.

## CONCLUSION

In conclusion, higher-order cesarean sections represent a significant reality, and there is an urgent need to reduce their incidence. Encouraging efforts should focus on reducing primary and elective repeat cesarean sections, protocols should be made to operate higher order cesarean sections, and dire need to reduce family size with widespread use and implementation of family planning methods.

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## CONFLICT OF INTEREST

There is no conflict of interest.

## ETHICAL APPROVAL

The study received approval from the hospital's ethical committee (letter # CMH Atd-ETH-81-Gyane-23).

## AUTHORS CONTRIBUTION

SI: Designed, conceived the idea, registered trial, helped in data collection, and manuscript writing. AA: Manuscript editing, statistical analysis. SM: Data collection, data interpretation. SG: Did statistical analysis, final review, and manuscript editing. NM: Supervised the entire study and was responsible for the integrity of the study. AT: Manuscript review and final approval of study.

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