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Frequency of Maternal Morbidity in High Order Cesarean Section

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ABSTRACT

Background: High-order cesareans are linked with higher maternal morbidity, including dense adhesions, placenta previa, rupture of uterus, and injury to the bladder. All these complications are frequently attributed to multiple procedures with resultant scarring and alteration of placental attachment. It is important to identify potential causes for these morbidities, including age, BMI, socioeconomic status, and residential area, as these are important to enhance better patient outcomes. **Objective:** To determine the frequency of maternal morbidity in high order cesarean section at Hayatabad Medical complex Peshawar. **Study Design:** Descriptive, cross-sectional study. **Duration and Place of Study:** The study was conducted between July 2024 and January 2025 at the Department of Obstetrics and Gynecology, Hayatabad Medical complex Peshawar. **Methodology:** The study recruited a total of 150 pregnant women aged 18–40 years with singleton pregnancy and undergoing elective high-order cesarean section. Information on demographic (age, gestational age, parity, BMI, socioeconomics, and residence), maternal morbidities, and maternal health outcomes was recorded. Maternal morbidities were identified and graded with respect to operative findings noted in cesarean section. **Results:** The study found a high prevalence of maternal morbidities: dense adhesions (56%), placenta previa (87.3%), uterine rupture (83.3%), and bladder injury (88.7%). Stratified analysis revealed that younger women (age ≤30 years) had a significantly lower incidence of dense adhesions, while women with higher BMI and lower socioeconomic status had higher occurrences of placenta previa and uterine rupture. **Conclusion:** High-order cesarean sections are associated with an increased risk of maternal morbidities, particularly in women with higher BMI, lower socioeconomic status, and rural residence.

INTRODUCTION

Cesarean section (C-section) is a surgical delivery of a baby through an incision in the mother's abdomen and uterus. It is generally done when a vaginal delivery would put the mother or child in danger like in cases of fetal distress, placenta problems or abnormal position.[1] From medical indications, maternal preference and previous complications during childbirth, C-sections have become increasingly common worldwide.[2] However it, compared to vaginal delivery, has higher risks of maternal morbidity but is lifesaving.

The term 'repeat' C-section when applied refers to a C-section after a woman has had multiple previous C-sections.[3] Each subsequent C-section increases the risk of complications and it is a high-risk procedure.[4] These risks are both short term and long term such as increased likelihood of surgical site infection, postpartum hemorrhage, and longer recovery.[5] Cesarean sections increase in complexity each time since the surgical process becomes further complicated with adhesions from previous surgeries present, which increases the likelihood of challenging surgeries and longer hospital stays and more intensive postoperative care.[6]

Multiple cesarean sections are commonly associated with formation of dense adhesions between organs from previous surgeries, and in fact, this is a cause of maternal morbidity. Future surgeries complicated by these adhesions can become more complex and increase the risk of accidental injury to adjacent structures, such as bladder, intestines, and blood vessels.[7] Also, women who have multiple C-sections have an increased risk for placenta previa — in which the placenta overlaps or is within the cervical os.[8] Severe bleeding at delivery is possible from placenta previa, which requires delivery before labor begins by C-section and makes for higher risk for both the mother and baby.[9]

Repeat C-section is also another major concern when uterine dehiscence (rupture) happens, usually where the incision happened due to previous cesarean

sections.[10] Severe hemorrhage can also come from uterine rupture, which is a life-threatening risk to both the mother and the baby.[11] Another risk is injury to the bladder because the bladder is anatomically adjacent to the uterus and the scarring from past surgeries increases the possibility of damage during the procedure.[12] These are commonly complications which require immediate intervention, and can often have lasting effects in a woman's reproductive and urinary health.[13]

A study conducted by Nisa MUN and colleagues revealed that in patients who underwent high-order cesarean sections, the occurrence of dense adhesions was found to be 53.8%, placenta previa was observed in 85.7%, uterine rupture occurred in 86.7%, and bladder injury was present in 92.3% of the cases.[14]

Maternal morbidity in high order cesarean sections is of need to study, as many women are having multiple C section and the risk for many complications increases. To improve surgical outcomes, reduce risks, and improve post-operative care it is important to understand the specific maternal health issue, such as dense adhesions, placenta previa, uterine rupture, and bladder injury. Healthcare providers are better able to predict complications, to take preventive measures and to minimize morbidity due to high order cesarean deliveries, with an understanding of these complications.

METHODOLOGY

This descriptive study was conducted between July 2024 and January 2025 at the Department of Obstetrics and Gynecology, Hayatabad Medical complex Peshawar, with a total of 150 participants. The sample size was calculated using the WHO sample size software, based on a 95% confidence level, an 8% margin of error, and an anticipated frequency of dense adhesions of 53.8% in patients with high-order cesarean sections.[14] The inclusion criteria involved women aged 18 to 40 years with a singleton pregnancy, gestational age greater than 36 weeks, and undergoing elective high-order cesarean sections (four or more prior C-sections). Patients with a history of diabetes, chronic hypertension, placental abruption, classical scars, or prior non-cesarean abdominal surgery were excluded from the study.

Patients meeting the inclusion criteria were enrolled after receiving ethical committee approval and providing informed consent. Basic demographic data, including age, gestational age, parity, body mass index (BMI), socioeconomic status and residential status, were collected at the time of enrollment. All cesarean sections were performed under the supervision of a consultant gynecologist with at least three years of post-fellowship experience. The procedure involved a Pfannenstiel incision, with the uterine incision made transversely in the lower uterine segment. After achieving hemostasis, the abdominal wall was closed in layers, and the skin was sutured using 3-0 Vicryl sutures. Postoperative care was provided according to the hospital protocol.

During the C-sections, the presence of maternal morbidities such as dense adhesions, placenta previa, uterine rupture, and bladder injury was assessed using the defined criteria. Dense adhesions were defined as white fibrinous layers that were difficult to separate during the procedure. Placenta previa was identified by visual examination of the placenta during surgery and was classified into four grades based on its proximity to the internal cervical os, ranging from Grade I (placenta lying within the lower uterine segment but not reaching the cervical os) to Grade IV (placenta completely covering the internal cervical os). Uterine rupture was identified as a tear or disruption in the uterine muscle, which could extend into the bladder or broad ligament. Bladder injury was identified by the presence of blue-tinged urine after indigo carmine injection, indicating leakage from the bladder.

The collected data were analyzed using SPSS version 26. Frequencies and percentages were calculated for categorical variables, such as socioeconomic status and maternal morbidities, including dense adhesions, placenta previa, uterine rupture, and bladder injury. Continuous variables such as age, gestational age, BMI and parity were presented as mean ± standard deviation. Stratified analysis was performed for maternal morbidities based on age, gestational age, parity, BMI, socioeconomic status and residential status. Post-stratification, chi-square tests were applied, and results were considered statistically significant at $p \leq 0.05$.

RESULTS

The patient demographics presented in Table-I reveal that the mean age of participants is 31.4 years (±2.96), with a mean gestational age of 37.72 weeks (±0.70), a mean parity of 5.09 (±0.97), and a mean BMI of 30.35 (±2.14). The majority of participants have a low socioeconomic status (65.3%), followed by a middle socioeconomic status (27.3%), and a small percentage have a rich status (7.3%). Most participants reside in rural areas (74%), with the remainder living in urban settings (26%).

Table I

Patient Demographics

Demographics		Mean ± SD / n (%)
Age (years)		31.400±2.96
Gestational Age (weeks)		37.720±0.70
Parity		5.093±0.97
BMI (Kg/m^2)		30.350±2.14
Socioeconomic Status	Low	98 (65.3%)
	Middle	41 (27.3%)
	Rich	11 (7.3%)
Residential Status	Rural	111 (74%)
	Urban	39 (26%)

Maternal morbidity, as shown in Table-II, indicates that the prevalence of various conditions includes dense

adhesions (56%), placenta previa (87.3%), uterine rupture (83.3%), and bladder injury (88.7%).

Table II

Maternal morbidity

Maternal morbidity	Frequency	%age
Dense adhesions	84	56%
Placenta previa	131	87.3%
Uterine rupture	125	83.3%
Bladder injury	133	88.7%

Stratified analyses of maternal morbidity with demographic factors in Table-III show that for dense adhesions, age ≤30 years had a significantly lower occurrence (42.1%) compared to age >30 years (64.5%) with a p-value of 0.007. Parity, BMI, socioeconomic status, and residential status did not show significant associations with dense adhesions. Regarding placenta previa, those with BMI >27 had a significantly higher occurrence (90.5%) compared to those with BMI ≤27 (70.8%), with a p-value of 0.008. Moreover, participants with low socioeconomic status had a significantly higher occurrence of placenta previa (89.8%) than those with middle or rich status, with a p-value of 0.007. The age and residential status were not significantly associated with placenta previa. Uterine rupture did not show significant associations with age, parity, or BMI, but a significant association was observed with socioeconomic status (p=0.024), where low-status individuals had a higher incidence of uterine rupture (86.7%) than middle-status individuals (82.9%). Furthermore, rural participants had a significantly higher incidence of uterine rupture (88.3%) compared to urban participants (69.2%) with a p-value of 0.006.

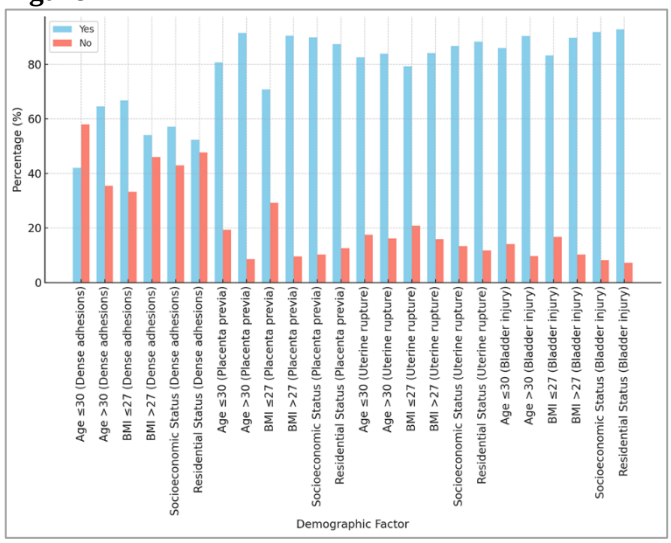
For bladder injury, no significant associations were found with age, parity, or BMI, but participants from rural areas had a significantly higher incidence (92.8%) compared to urban participants (76.9%) with a p-value of 0.007. Socioeconomic status did not show significant differences in bladder injury occurrence.

Table III

Association of Maternal morbidity with Demographic Factors

Demographic Factors		Dense adhesions YES n(%)	Dense adhesions NO n(%)	p-value
Age (years)	≤30	24(42.1%)	33(57.9%)	0.007
	>30	60(64.5%)	33(35.5%)	
Parity	≤6	73(54.1%)	62(45.9%)	0.180*
	>6	11(73.3%)	4(26.7%)	
BMI (Kg/m^2)	≤27	16(66.7%)	8(33.3%)	0.251
	>27	68(54%)	58(46%)	
Socioeconomic Status	Low	56(57.1%)	42(42.9%)	0.413*
	Middle	24(58.5%)	17(41.5%)	
	Rich	4(36.4%)	7(63.6%)	
Residential Status	Rural	58(52.3%)	53(47.7%)	0.119
	Urban	26(66.7%)	13(33.3%)	
Demographic Factors		**Placenta previa YES n(%)**	**Placenta previa NO n(%)**	**p-value**
Age (years)	≤30	46(80.7%)	11(19.3%)	0.056
	>30	85(91.4%)	8(8.6%)	
Parity	≤6	116(85.9%)	19(14.1%)	0.218*
	>6	15(100%)	0(0%)	
BMI (Kg/m^2)	≤27	17(70.8%)	7(29.2%)	0.008
	>27	114(90.5%)	12(9.5%)	
Socioeconomic Status	Low	88(89.8%)	10(10.2%)	0.007*
	Middle	37(90.2%)	4(9.8%)	
	Rich	6(54.5%)	5(45.5%)	
Residential Status	Rural	97(87.4%)	14(12.6%)	1.000*
	Urban	34(87.2%)	5(12.8%)	
Demographic Factors		**Uterine rupture YES n(%)**	**Uterine rupture NO n(%)**	**p-value**
Age (years)	≤30	47(82.5%)	10(17.5%)	0.821
	>30	78(83.9%)	15(16.1%)	
Parity	≤6	115(85.2%)	20(14.8%)	0.135*
	>6	10(66.7%)	5(33.3%)	
BMI (Kg/m^2)	≤27	19(79.2%)	5(20.8%)	0.767*
	>27	106(84.1%)	20(15.9%)	
Socioeconomic Status	Low	85(86.7%)	13(13.3%)	0.024*
	Middle	34(82.9%)	7(17.1%)	
	Rich	6(54.5%)	5(45.5%)	
Residential Status	Rural	98(88.3%)	13(11.7%)	0.006
	Urban	27(69.2%)	12(30.8%)	
Demographic Factors		**Bladder injury YES n(%)**	**Bladder injury NO n(%)**	**p-value**
Age (years)	≤30	49(86%)	8(14%)	0.414
	>30	84(90.3%)	9(9.7%)	
Parity	≤6	118(87.4%)	17(12.6%)	0.220
	>6	15(100%)	0(0%)	
BMI (Kg/m^2)	≤27	20(83.3%)	4(16.7%)	0.479
	>27	113(89.7%)	13(10.3%)	
Socioeconomic Status	Low	90(91.8%)	8(8.2%)	0.278*
	Middle	34(82.9%)	7(17.1%)	
	Rich	9(81.8%)	2(18.2%)	
Residential Status	Rural	103(92.8%)	8(7.2%)	0.007
	Urban	30(76.9%)	9(23.1%)	

Figure 1



DISCUSSION

The increased rate of these morbidities among high-order cesarean section women can be explained scientifically on the grounds of resultant effects of repeated operations, including more chance of adhesions, placental implantation abnormalities, and rupture of the uterus. Each cesarean section may result in damage to and scarring of the uterine wall, with consequent more complicated pregnancies next time around. Placenta previa and other maternal morbidities are also more so among multiple cesarean section patients because of scarring of the endometrium leading to influences on placental attachment. The association of

maternal morbidity with socioeconomic and residence factors highlights why greater emphasis needs to be laid on improving ante-natal care and monitoring, especially in rural areas where healthcare may lack access and geographical mobility.

Our study results align with the findings of several previous studies on maternal morbidity in high-order cesarean sections. Similar to the study by El-Shabrawy Ali et al.[15] our study also observed a high prevalence of complications, particularly dense adhesions (56%), placenta previa (87.3%), uterine rupture (83.3%), and bladder injury (88.7%). This demonstrates a common trend across different regions, where repeated cesarean sections lead to a significant increase in complications such as adhesions and abnormal placental conditions. Specifically, the incidence of dense adhesions in our study was comparable to El-Shabrawy Ali et al.'s finding of 59.39%, indicating a strong correlation between the number of cesarean sections and the likelihood of intra-abdominal adhesions.

A significant similarity is also seen in Karaman et al.[16] where the incidence of placenta previa and placental accreta increased with the number of cesarean sections. Our findings confirm this association, with participants who had higher BMI and lower socioeconomic status showing significantly higher rates of placenta previa. Specifically, women with a BMI >27 had a much higher occurrence of placenta previa (90.5%) compared to those with BMI ≤27 (70.8%), and similarly, participants with low socioeconomic status had a higher incidence of placenta previa (89.8%) compared to those with middle or rich status. These results reinforce the importance of considering demographic factors like BMI and socioeconomic status when assessing the risk of maternal morbidities in high-order cesarean deliveries. In Karaman et al.'s study, the prevalence of placenta previa in high-order cesarean deliveries was 11.1%, which is comparable to our finding of 87.3%.

Furthermore, our findings regarding the association between socioeconomic status and uterine rupture align with those of Akrm et al.[17] where women with lower socioeconomic status exhibited a higher incidence of complications like uterine rupture. In our study, low-status individuals had a higher incidence of uterine rupture (86.7%) compared to middle-status individuals (82.9%), and rural participants had a significantly higher incidence (88.3%) compared to urban participants (69.2%). These findings are in line with Akrm et al.'s results, where maternal complications were more prevalent among women with multiple cesarean sections, although their study did not specify a strong link between rural residence and complications. The higher incidence in rural participants in our study could reflect limited access to specialized healthcare and facilities in these areas.

While Hawisa and Algerbi[18] also observed a higher prevalence of placenta previa and dense adhesions in women with multiple cesarean sections, they did not find significant associations between age and other demographic factors in relation to these conditions. However, our study adds depth to this by showing that younger women (age ≤30 years) had a significantly lower occurrence of dense adhesions (42.1%) compared to those older than 30 years (64.5%). This finding suggests that age may influence the likelihood of developing certain complications, which was not conclusively addressed in previous studies.

Iffet et al.[19] also noted that women with multiple cesarean sections were more likely to experience complications such as uterine rupture, adhesion formation, and morbidly adherent placenta, all of which were significant findings in our study. The increased risk of uterine rupture observed in our rural participants is consistent with previous studies that identified the importance of surgical expertise and adequate healthcare infrastructure in managing these high-risk pregnancies, especially in less urbanized areas.

These results are consistent with prior research buy essay pointing to higher risks of dense adhesions, placenta pre-via, rupture of the uterus, and bladder injury with every increase in cesarean section delivery. The effect of aspects such as SES, BMI, as well as area of residence, underscores the necessity of intervening in these risk factors among high-risk groups.

Even with these significant findings, there are some limitations to consider in this study. First, as a single-center study, its results may not apply to all healthcare institutions or regions. Secondly, having a small sample size and no randomization will limit its generalizability. Future multiple-center studies with larger populations and greater diversity are necessary to reproduce these findings as well as to see if other possible factors are involved in causing maternal morbidity with high-order cesarean sections.

CONCLUSION

According to research, high-order cesareans are associated with increased maternal morbidity risks, particularly in terms of conditions such as dense adhesions, placenta previa, rupture of uterus, and bladder damage. Socioeconomics, BMI, and geographical location are highlighted by research as determining factors in such outcomes. Our study underscores the need to treat such high-risk pregnancies with close monitoring and appropriate interventions to minimize maternal complications.

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