

Original Research Article

INTRAOPERATIVE AND POSTOPERATIVE COMPLICATIONS IN REPEAT CAESAREAN SECTIONS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Repeat caesarean section has become increasingly common with the rising prevalence of primary caesarean delivery. Although advances in anaesthesia, blood transfusion, antibiotics and perioperative care have improved the safety of caesarean delivery, repeat caesarean section may be associated with operative difficulties and maternal and neonatal complications. Previous caesarean delivery may predispose women to adhesions, scar-related abnormalities, haemorrhage, bladder injury, placental complications and postoperative morbidity. The present study was undertaken to evaluate the intraoperative and postoperative complications associated with repeat caesarean section and to assess their relationship with relevant maternal and obstetric factors. **Aim:** To study the intraoperative and postoperative complications in women undergoing repeat caesarean section and to analyse and categorize these complications according to age, parity, body mass index, medical disorders, number of previous caesarean sections, emergency or elective nature of the current caesarean section, and place of the previous caesarean section.

Materials and Methods: This hospital-based prospective observational study was conducted from October 2022 to September 2024 in the Department of Obstetrics and Gynecology, GSL General Hospital, Rajahmundry. A total of 200 women who had undergone one or more previous caesarean sections and underwent repeat caesarean delivery during the study period were included. Women undergoing primary caesarean section were excluded. Demographic, obstetric, clinical and perioperative data were recorded prospectively. Routine investigations and relevant special investigations were performed as clinically indicated. Intraoperative findings and complications were documented, while postoperative outcomes were monitored until discharge. Neonatal outcomes, including complications and neonatal intensive care unit (NICU) admissions, were also recorded. The collected data were analysed according to the type and incidence of intraoperative and postoperative complications and their relationship with age, parity, body mass index, medical disorders, number of previous caesarean sections, emergency or elective caesarean section, and place of the previous caesarean section. Statistical analysis was performed using SPSS, with the chi-square test used to assess statistical significance. Ethical clearance was obtained from the Ethics Committee of GSL Medical College, Rajahmundry, and informed consent was obtained from all enrolled participants.

Results: Among the 200 women undergoing repeat caesarean section, 173 (86.5%) had one previous caesarean section, 25 (12.5%) had two previous caesarean sections, and 2 (1.0%) had three previous caesarean sections. The largest proportion of women belonged to the 20–24-year age group (136, 68%), followed by the 25–29-year group (46, 23%). Women younger than 19 years

constituted 9 cases (4.5%), while 5 (3%) were aged 30–34 years and 4 (2%) were older than 35 years.

Adhesions, intraoperative complications and postoperative febrile morbidity were documented across the different age groups. The thesis reported statistically significant associations for adhesions and intraoperative complications in relation to age. The study also documented increasing operative morbidity with increasing numbers of previous caesarean sections. In the overall cohort, complications associated with repeat caesarean delivery included adhesions, scar dehiscence, haemorrhage, bladder injury and placental complications. The thesis reported haemorrhage in 11 cases (5.5%) and bladder injury in 6 cases (3%). Postoperative febrile morbidity included urinary tract infection in 12 cases (6%), wound infection in 8 (4%), endometritis in 3 (1.5%), upper respiratory tract infection in 3 (1.5%), lower respiratory tract infection in 1 (0.5%), and an unidentified cause in 2 (1%). NICU admission occurred in 48 neonates; the reported causes included unconjugated hyperbilirubinemia (12, 25%), hypoxic-ischaemic encephalopathy (10, 20.8%), prematurity (8, 16.6%), late-onset sepsis (7, 14.5%), early-onset sepsis (6, 12.5%), hypoglycaemia (2, 4.1%), hypocalcaemia (2, 4.1%) and Dandy-Walker syndrome (1, 2%). No perinatal deaths were reported in the study.

Conclusion: Repeat caesarean section was associated with a range of intraoperative and postoperative complications in this cohort. The study demonstrated an increasing burden of complications with successive caesarean sections, particularly adhesions and other operative complications, along with postoperative febrile morbidity. Careful antenatal assessment and appropriate perioperative planning are important in women undergoing repeat caesarean delivery, particularly those with multiple previous caesarean sections.

Keywords: repeat caesarean section; repeat caesarean delivery; intraoperative complications; postoperative complications; adhesions; bladder injury; haemorrhage; scar dehiscence; NICU admission.

INTRODUCTION

Caesarean section is one of the most commonly performed procedures in obstetric practice. Caesarean delivery involves delivery of the fetus through an incision made in the abdominal and uterine walls.^[1] The frequency of caesarean delivery has increased substantially over time, and the increasing use of primary caesarean section has resulted in a corresponding rise in pregnancies and deliveries following previous caesarean section.^[2] Improvements in anaesthesia, blood transfusion, antibiotics and surgical techniques have considerably improved the safety of the procedure; however, caesarean delivery continues to be associated with greater maternal morbidity than uncomplicated vaginal delivery.^[3,4]

The increasing prevalence of caesarean delivery has been documented in several countries. The thesis cites a rise in caesarean delivery rates in the United States from 4.5% in 1970 to 31% in 2007, with a rate of 32.8% reported in 2010.^[5] Rates of 24% in the United Kingdom in 2008, 26.1% in Ireland in 2009, 26% in Canada during 2005–2006 and 46% in China in 2008 were also cited.^[6] In India, the thesis describes an increase in caesarean delivery rates in teaching hospitals and reports an increase in the national rate from 2.9% of childbirths in 1992–1993 to 10.2% in 2005–2006.^[7] Repeat caesarean section

constituted a substantial proportion of deliveries in the cited Indian studies.^[8]

Several factors have been associated with the continuing increase in caesarean delivery. The thesis identifies increasing maternal age, increased use of electronic fetal monitoring, declining rates of operative vaginal delivery, increasing induction of labour, rising prevalence of obesity, changing management of preeclampsia, declining use of vaginal birth after caesarean (VBAC), increasing elective caesarean delivery for various indications and medicolegal considerations among the factors described in the literature.^[9–12]

A previous caesarean section is itself an important indication for subsequent caesarean delivery. The thesis notes that repeat caesarean section has become a leading indication for elective caesarean delivery, partly because of concerns regarding uterine rupture and other maternal and fetal complications associated with trial of labour after previous caesarean section.^[13–16] Although vaginal birth after caesarean can be successful in appropriately selected women, the decision regarding mode of delivery requires consideration of previous uterine surgery, the indication for the previous caesarean section, pelvic adequacy, availability of immediate emergency obstetric and anaesthetic services, and other maternal and fetal factors.^[17–20]

Repeat caesarean delivery is technically different from primary caesarean delivery because previous surgery can result in intra-abdominal adhesions and

distortion of normal anatomical planes. Multiple caesarean sections have been associated with an increased risk of dense adhesions, scar dehiscence, uterine rupture, abnormal placentation, haemorrhage, bladder injury and caesarean hysterectomy.^[21] These complications may contribute to increased operative difficulty, postoperative morbidity and prolonged hospital stay. The thesis also discusses the association between repeated caesarean delivery and postoperative complications, including infection and febrile morbidity.^[22]

The potential complications of repeat caesarean section are not restricted to the mother. Difficult delivery associated with adhesions and prolonged operative procedures may contribute to neonatal compromise in selected circumstances. The thesis reports that fetal injury, neonatal complications and NICU admission have been described in association with technically difficult caesarean deliveries. In the present study, neonatal outcomes were therefore also documented, including neonatal complications and NICU admissions.^[23]

The clinical importance of these complications is particularly relevant in settings where repeat caesarean delivery constitutes a substantial proportion of obstetric practice. Identification of the frequency and pattern of intraoperative and postoperative complications, together with assessment of their relationship with maternal age, body mass index, medical disorders, number of previous caesarean sections, emergency or elective nature of the procedure and place of previous caesarean delivery, may assist in anticipating operative difficulties and planning appropriate perioperative care.^[24,25]

Against this background, the present prospective observational study was undertaken among 200 women undergoing repeat caesarean section at GSL General Hospital, Rajahmundry. The study specifically evaluated intraoperative and postoperative complications and categorized these outcomes according to relevant maternal and obstetric characteristics.

The aim of the study was to assess the intraoperative and postoperative complications associated with repeat caesarean section and to analyse their distribution according to age, parity, body mass index, medical disorders, number of previous caesarean sections, emergency or elective caesarean delivery, and place of the previous caesarean section.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based prospective observational study conducted in the Department of Obstetrics and Gynecology, GSL General Hospital, Rajahmundry, during the period from October 2022 to September 2024. The study was undertaken to evaluate the intraoperative and postoperative complications associated with repeat caesarean section in 200 cases.

The source of data was GSL Medical College and General Hospital, Rajahmundry.

Study Population and Sample Size

The study included 200 women undergoing repeat caesarean section during the study period. All women who had undergone one or more previous caesarean sections were eligible for inclusion, irrespective of age and parity. Women undergoing primary caesarean section were excluded.

Inclusion Criteria

All women who had undergone one or more previous caesarean sections, irrespective of age and parity, were included in the study.

Exclusion Criteria

Women undergoing primary caesarean section were excluded from the study.

Data Collection

Patients fulfilling the eligibility criteria were enrolled after obtaining informed and written consent. Routine investigations included haemoglobin estimation, blood grouping and Rh typing, random blood sugar, urine examination for albumin, sugar and microscopy, viral screening and ultrasonography. Special investigations and additional ultrasonography were performed whenever clinically required. Tetanus immunization was provided as required.

Detailed case histories were recorded using case proformas. Information collected included presenting complaints, history of the presenting illness, menstrual and marital history, previous obstetric history, indication for the previous caesarean section, place of the previous caesarean section, significant antepartum and postpartum events, personal history, past medical and surgical history and family history.

Clinical Assessment

General examination and assessment of vital signs were performed, together with systemic examination of the cardiovascular, respiratory and central nervous systems. Abdominal examination was performed to assess gestational age by fundal height, uterine activity, scar tenderness and fetal presentation, lie and position. In vertex presentations, engagement or palpability of the presenting part was assessed.

Per vaginal examination, when clinically indicated, included assessment of cervical effacement and dilatation, position and station of the presenting part, presence or absence of caput and moulding, colour of liquor and pelvic assessment. The decision to proceed with caesarean section was based on clinical assessment of labour progression, fetal condition, station and position of the presenting part, and maternal condition. Tubectomy was performed whenever indicated.

Perioperative Assessment

The type of anaesthesia was determined by the anaesthetist. Intraoperative findings and operative details were recorded, and complications encountered during surgery were appropriately managed.

Neonatal data were recorded following delivery, and newborns were observed for complications and requirement for admission to the neonatal intensive

care unit (NICU). All cases were attended by a paediatrician.

Postoperative Follow-up

The postoperative period was monitored and postoperative complications were managed promptly. Patients were followed until discharge. According to the original study protocol, women with an uncomplicated postoperative course were discharged after the seventh postoperative day. At discharge, a summary card was provided and postoperative review after 4 weeks was advised.

Study Outcomes

The principal outcomes assessed were the type and incidence of intraoperative and postoperative complications associated with repeat caesarean section. Neonatal complications and NICU admissions were also recorded. The observed intraoperative complications, postoperative complications and NICU admissions were further categorized according to maternal age, parity, body mass index, medical disorders, number of previous caesarean sections, emergency or elective nature of the current caesarean section and place of the previous caesarean section.

Statistical Analysis

The collected data were analysed using SPSS software. The type and incidence of intraoperative and postoperative complications were assessed, and the association of observed complications with the specified maternal and obstetric variables was evaluated. The chi-square test was used to calculate the P value and assess statistical significance.

Ethical Considerations

Informed consent was obtained from all participants before commencement of the study. The purpose of the study was explained to prospective participants in the local language, and women willing to participate were included. Ethical clearance for the study was obtained from the Ethics Committee of GSL Medical College, Rajahmundry.

RESULTS

The present study included 200 women who underwent repeat caesarean section. Of these, 173 (86.5%) had one previous caesarean section, 25 (12.5%) had two previous caesarean sections and 2 (1%) had three previous caesarean sections.

Table 1: Distribution of Cases According to Age Group

Age group	No. of cases	Percentage
<19 years	9	4.5%
20–24 years	136	68%
25–29 years	46	23%
30–34 years	5	3%
>35 years	4	2%
Total	200	100%

The age distribution of the study population showed that most women undergoing repeat caesarean section were in the 20–24-year age group.

Table 2: Relationship of Age Group with Intraoperative Complications and Postoperative Febrile Morbidity

Age group	No. of cases	Adhesions	Intraoperative complications	Postoperative febrile morbidity
>19 years*	9	3 (23.7%)	4 (44.4%)	1 (11.1%)
20–24 years	136	41 (21.1%)	37 (27.2%)	19 (14%)
25–29 years	46	14 (40%)	14 (30.4%)	5 (10.9%)
30–34 years	5	3 (75%)	—	3 (60%)
>35 years	4	1 (69%)	1 (25%)	1 (25%)
P value		0.004	0.000	—

The distribution of adhesions, intraoperative complications and postoperative febrile morbidity according to maternal age was assessed.

The original table reports the first category as “>19 years”, although the accompanying text describes this group as <19 years. The original table value has been retained without alteration.

Table 3: Relationship of Complications with Body Mass Index

BMI category	No. of cases	Wound infection	Secondary suturing	Postoperative hospital stay
18–24.9, Normal	151	4 (12%)	1 (0.6%)	23 (15%)
25–29.9, Overweight	33	3 (9%)	2 (6%)	6 (18%)
30–34.9, Obese class I	16	1 (6%)	—	4 (25%)

The relationship between BMI and selected postoperative complications was evaluated among the study participants.

Table 4: Types of Medical Disorders and Their Incidence

Medical disorder	Frequency	Percentage
Pregnancy-induced hypertension (PIH)	9	42.8%
Asthma	2	9.5%
Diabetes, hypertension and cerebrovascular accident	1	4.7%
Epilepsy	2	9.5%
Gestational diabetes mellitus	2	9.5%
Heart disease	1	4.7%
Hypothyroidism	2	9.5%
Intercurrent eclampsia	1	4.7%
Schizophrenia	1	4.7%
Total	21	100%

Medical disorders were present in 21 of the 200 women included in the study.

Table 5: Relationship of Postoperative Hospital Stay and Medical Disorders

Medical disorder	<1 week	1–2 weeks	2–3 weeks	>3 weeks
Asthma	10%	—	—	—
Diabetes, hypertension and cerebrovascular accident	—	—	—	4.7%
Epilepsy	5%	—	—	—
Gestational diabetes mellitus	—	5%	4.7%	—
Heart disease	5%	—	—	—
Hypothyroidism	9.5%	—	—	—
Intercurrent eclampsia	5%	—	—	—
PIH	23%	9.5%	4.7%	4.7%
Schizophrenia	5%	—	—	—

The distribution of postoperative hospital stay according to the recorded medical disorders was as follows.

Table 6: Relationship of Prolonged Hospital Stay (>1 Week) in Cases with Medical Disorders

Category	Frequency	Percentage
Cases with medical disorders	6	28%
P value		0.000

Among the 21 women with medical disorders, 6 had a prolonged hospital stay of more than one week.

Table 7: Relationship of Medical Disorders and Body Mass Index

BMI category	Frequency	Percentage
18–24.9, Normal	13	8.60%
25–29.9, Overweight	4	12%
30–34.9, Obese class I	4	25%

The occurrence of medical disorders was assessed across the BMI categories.

Table 8: Distribution of Cases According to Place of Previous Caesarean Section

Place of previous caesarean section	Frequency	Percentage
GSL Hospital	66	33%
Private hospitals	134	67%
Total	200	100%

Information regarding the place where the previous caesarean section had been performed was available for all 200 women.

Table 9: Relationship of Place of Previous Caesarean Section and Intraoperative Complications

Place of previous CS	No. of cases	Adhesions	Other intraoperative complications
GSL Hospital	66	18% (12)	15.1% (10)
Private hospitals	134	37.7% (50)	34.4% (46)

Adhesions and other intraoperative complications were compared according to the place of the previous caesarean section.

Table 10: Incidence of Emergency and Elective Caesarean Sections

Type of caesarean section	Frequency	Percentage
Emergency	93	46.5%
Elective	107	53.5%
Total	200	100%

Of the 200 repeat caesarean sections, 107 were elective and 93 were emergency procedures.

Table 11. Relationship of Intraoperative Complications with Emergency/Elective Caesarean Section

Type of caesarean section	Frequency of intraoperative complications	Percentage
Emergency	28	30.1%
Elective	28	26.1%

The incidence of intraoperative complications was compared between emergency and elective repeat caesarean sections.

Table 12: Distribution of Cases According to Number of Previous Caesarean Sections

Number of previous CS	Frequency	Percentage
1	173	86.50%
2	25	12.50%
3	2	1%
Total	200	100%

Most women had undergone one previous caesarean section.

Table 13: Relationship of Intraoperative Complications with Number of Previous Caesarean Sections

Intraoperative complication	Overall frequency	1 previous CS (n=173)	2 previous CS (n=25)	3 previous CS (n=2)
Adhesions	64	50 (28.9%)	13 (52%)	1 (50%)
Thinned-out LUS	35	26 (15%)	8 (32%)	1 (50%)
Haemorrhage	11	6 (3.4%)	5 (20%)	1 (50%)
Difficulty in delivery of fetus	9	6 (3.4%)	2 (8%)	1 (50%)
Scar dehiscence	8	5 (2.8%)	3 (12%)	—
Bladder injuries	6	5 (2.8%)	1 (4%)	—
Extension of incision	5	4 (2.3%)	1 (4%)	—
Placenta percreta	2	1 (0.5%)	1 (4%)	—
Hysterectomy	2	1 (0.5%)	1 (4%)	—
P value				0.000, significant

The frequency of individual intraoperative complications was evaluated according to the number of previous caesarean sections.

Table 14: Causes of Haemorrhage

Cause of haemorrhage	Frequency
Postpartum haemorrhage (PPH)	2
Placenta previa	2
Placenta percreta	2
Adhesions	2
Extension of incision	1
Twins + placenta previa + PPH	1
PIH with abruption	1
Total	11

The recorded causes of haemorrhage among women undergoing repeat caesarean section were as follows.

Table 15: Types of Adhesions and Their Incidence

Type of adhesion	No. of cases
Parietal peritoneum and anterior surface of uterus	36
Parietal peritoneum and omentum	36
Rectus muscle adhered to peritoneum	32
Parietal peritoneum and bladder	3
Omentum and uterus	9
Bladder and uterus (dense)	4
Bladder and uterus (filmy)	13

Different types of adhesions encountered during repeat caesarean section were documented.

Table 16: Intraoperative Findings in Cases with Scar Tenderness

Intraoperative finding	Frequency	Percentage
Thinned-out lower uterine segment	5	25%
Thinned-out LUS and adhesions	2	10%
Scar dehiscence	1	5%
Only adhesions	1	5%

The thesis recorded the following intraoperative findings among cases presenting with scar tenderness.

Table 17: Relationship of Postoperative Complications with Number of Previous Caesarean Sections

Postoperative complication	1 previous CS	2 previous CS	3 previous CS
Paralytic ileus (20)	17 (9.8%)	3 (12%)	—
Wound infection (8)	4 (2.3%)	4 (16%)	—
Secondary suturing (3)	2 (1.1%)	1 (4.4%)	—

Selected postoperative complications were compared according to the number of previous caesarean sections.

Table 18: Relationship of Febrile Morbidity with Number of Previous Caesarean Sections

Number of previous CS	Cases with febrile morbidity
1	19 (10.9%)
2	8 (32%)
3	—

The occurrence of postoperative febrile morbidity according to the number of previous caesarean sections was recorded as follows.

Table 19: Postoperative Hospital Stay According to Number of Previous Caesarean Sections

No. of previous CS	No. of cases with prolonged stay	1–2 weeks	2–3 weeks	>3 weeks
1	27 (15.6%)	22	3	2
2	6 (24%)	4	2	—
3	—	—	—	—

The duration of postoperative hospital stay was assessed according to the number of previous caesarean sections.

Table 20: Causes of Postoperative Febrile Morbidity

Cause	Frequency	Percentage
Urinary tract infection	12	6%
Wound infection	8	4%
Endometritis	3	1.5%
Upper respiratory tract infection	3	1.5%
Lower respiratory tract infection	1	0.5%
Unknown	2	1%

The causes of postoperative febrile morbidity were documented among the study participants.

Table 21: Causes of NICU Admissions

Cause of NICU admission	Frequency	Percentage
Unconjugated hyperbilirubinemia	12	25%
Hypoxic-ischaemic encephalopathy	10	20.8%
Preterm	8	16.6%
Late-onset sepsis	7	14.5%
Early-onset sepsis	6	12.5%
Hypoglycaemia	2	4.1%
Hypocalcaemia	2	4.1%
Dandy-Walker syndrome	1	2%
Total	48	100%

A total of 48 neonates required NICU admission. The recorded causes were as follows.

Table 22: NICU Admissions in Relation to Type of Caesarean Section and Medical Disorders

Variable	Frequency among NICU admissions (n=48)	Percentage
Elective caesarean section	19	39.5%
Emergency caesarean section	29	60.4%
Maternal medical disorders present	5	10.4%
P value – type of CS		0.000, significant
P value – medical disorders		0.000, significant

NICU admissions were further assessed according to the type of caesarean section and presence of maternal medical disorders.

Tables Summary

Table 1: Among the 200 women undergoing repeat caesarean section, the largest proportion belonged to the 20–24-year age group (68%), followed by the 25–29-year age group (23%). Table 2: Adhesions and intraoperative complications were reported across all age categories, with the thesis reporting statistically significant associations for adhesions and intraoperative complications. The highest recorded adhesion proportion was in the 30–34-year group. Table 3: Most women had a normal BMI of 18–24.9 kg/m². Postoperative hospital stay was recorded in 25% of women in the obese class I group, while wound infection and secondary suturing were also recorded across BMI categories. Table 4: Medical disorders were present in 21 women. Pregnancy-induced hypertension was the most frequently recorded disorder, accounting for 9 cases (42.8%).

Table 5: The recorded postoperative hospital stay varied across the different medical disorders. Two cases were reported to have a hospital stay exceeding 3 weeks. Table 6: Six of the 21 women with medical disorders had a postoperative hospital stay exceeding one week, corresponding to 28%, with a reported P value of 0.000. Table 7: Medical disorders were recorded across all three BMI categories represented in the table, with the highest reported proportion in the obese class I group. Table 8: Previous caesarean section had been performed in a private hospital in 134 women (67%) and at GSL Hospital in 66 women (33%). Table 9: The recorded frequencies of adhesions and other intraoperative complications were higher among women whose previous caesarean section had been performed in private hospitals. Table 10: Elective repeat caesarean section accounted for 53.5% of procedures, while 46.5% were

emergency procedures. Table 11: Intraoperative complications were recorded in 30.1% of emergency procedures and 26.1% of elective procedures. Table 12: The majority of women had one previous caesarean section (86.5%), while 12.5% had two and 1% had three previous caesarean sections. Table 13: Adhesions were the most frequently recorded intraoperative complication. The table demonstrates higher reported frequencies of several complications among women with increasing numbers of previous caesarean sections, with a reported P value of 0.000. Table 14: Eleven cases of haemorrhage were recorded. Postpartum haemorrhage, placenta previa, placenta percreta and adhesions were each recorded as causes in two cases. Table 15: Adhesions involving the parietal peritoneum and anterior surface of the uterus and those involving the parietal peritoneum and omentum were the most frequently recorded adhesion patterns. Table 16: Among the reported intraoperative findings in cases with scar tenderness, a thinned-out lower uterine segment was the most frequent finding. Table 17: Paralytic ileus, wound infection and secondary suturing were recorded as postoperative complications, with several complications showing higher proportions among women with two previous caesarean sections. Table 18: Febrile morbidity was reported in 10.9% of women with one previous caesarean section and 32% of those with two previous caesarean sections. Table 19: Prolonged postoperative hospital stay was reported in 15.6% of women with one previous caesarean section and 24% of those with two previous caesarean sections. Table 20: Urinary tract infection was the most frequently recorded cause of postoperative febrile morbidity (6%), followed by wound infection (4%). Table 21: Forty-eight neonates required NICU admission. Unconjugated hyperbilirubinemia was the most frequently recorded cause (25%), followed by hypoxic-ischaemic encephalopathy (20.8%) and prematurity (16.6%). Table 22: Among NICU admissions, 60.4% followed emergency caesarean section and 39.5% followed elective caesarean section. The thesis reported statistically significant P values of 0.000 for the analysed associations.

DISCUSSION

Repeat caesarean section is associated with a range of maternal and neonatal complications, and the risk of several operative complications may increase with successive caesarean deliveries.^[1] In the present prospective observational study of 200 women undergoing repeat caesarean section, the principal complications identified were adhesions, thinned-out lower uterine segment, haemorrhage, scar dehiscence, bladder injury, extension of the uterine incision, placental complications and hysterectomy.^[2] Postoperative morbidity included urinary tract infection, wound infection, endometritis and prolonged hospital stay. Neonatal outcomes

included NICU admission for prematurity, hypoxic-ischaemic encephalopathy, neonatal sepsis, hyperbilirubinemia and other recorded complications.^[3]

The majority of women in the present study were 20–24 years of age (68%), followed by 25–29 years (23%). The relatively young age distribution reflects the obstetric population included in the study. The study also evaluated the relationship between maternal age and operative morbidity. Adhesions and intraoperative complications were reported across the different age groups, with statistically significant associations reported for adhesions and intraoperative complications.^[4]

Body Mass Index and Medical Disorders

Medical disorders were documented in 21 of the 200 women. Pregnancy-induced hypertension was the most frequently recorded disorder, accounting for 42.8% of the women with medical disorders. Other recorded conditions included asthma, epilepsy, gestational diabetes mellitus, hypothyroidism, heart disease, schizophrenia and intercurrent eclampsia.^[5] The study also examined the relationship between BMI and medical disorders. Medical disorders were recorded in 12% of women with BMI 25–29.9 kg/m² and in 25% of women with BMI 30–34.9 kg/m². Thus, within the BMI categories represented in the study, the proportion of women with medical disorders was higher among those in the obese class I category.^[6]

Number of Previous Caesarean Sections and Intraoperative Complications

The number of previous caesarean sections was an important factor associated with operative morbidity. Most women in the study had one previous caesarean section (86.5%), while 12.5% had two previous caesarean sections and 1% had three previous caesarean sections.

The present study demonstrated a higher frequency of several intraoperative complications among women with two previous caesarean sections. Adhesions were documented in 52% of women with two previous caesarean sections compared with 28.9% of women with one previous caesarean section. A thinned-out lower uterine segment was observed in 32% of women with two previous caesarean sections compared with 15% with one previous caesarean section.^[7] Haemorrhage, scar dehiscence, bladder injury and extension of the uterine incision were also reported more frequently in women with two previous caesarean sections. The thesis reported the overall association between number of previous caesarean sections and intraoperative complications as statistically significant.^[8]

These findings support the observation that repeated entry into the abdomen and pelvis can be associated with progressive operative difficulty. Dense adhesions can obscure normal tissue planes and may complicate access to the lower uterine segment and bladder. The increased operative difficulty may consequently contribute to haemorrhage, bladder

injury, difficulty in fetal delivery and other surgical complications.

Adhesions

Adhesions represented the most frequently documented intraoperative finding in the present study. Adhesions were observed in 28.9% of women with one previous caesarean section, 52% of those with two previous caesarean sections and 50% of those with three previous caesarean sections.

The common adhesion patterns recorded in the study included adhesions between the parietal peritoneum and anterior surface of the uterus, between the parietal peritoneum and omentum, and between the rectus muscle and peritoneum. Adhesions involving the bladder and uterus were also documented. Adhesiolysis was required in affected cases, and the thesis noted that some women required a higher abdominal incision because of adhesions.^[9]

The increasing frequency of adhesions with successive caesarean sections is clinically important because adhesions may increase operative time and make dissection more difficult. The thesis also noted excessive bleeding in some cases because of increased raw surface area following adhesiolysis.

Thinned-Out Lower Uterine Segment

A thinned-out lower uterine segment was another important intraoperative finding. In the present study, it was observed in 15% of women with one previous caesarean section, 32% of those with two previous caesarean sections and 50% of those with three previous caesarean sections.^[10]

The increasing proportion across the categories of previous caesarean delivery suggests an association between repeated uterine surgery and thinning of the lower uterine segment. Recognition of a markedly thinned lower uterine segment is relevant during repeat caesarean delivery because it may increase technical difficulty and may be associated with scar-related complications.^[11]

Scar Dehiscence

Scar dehiscence was identified in 8 women (4%) in the present study. It occurred in 2.8% of women with one previous caesarean section and 12% of women with two previous caesarean sections. Three of the eight cases (37.5%) were identified incidentally during surgery.^[12]

The thesis noted that four of the eight women with scar dehiscence were in early labour. Although scar dehiscence and uterine rupture have been described in association with previous uterine surgery and labour, no case of complete uterine rupture was observed in the present study.^[13]

Haemorrhage

Intraoperative haemorrhage occurred in 11 women (5.5%). The documented causes included postpartum haemorrhage, placenta previa, placenta percreta, adhesions, placental abruption and extension of the uterine incision.

Haemorrhage is an important complication during repeat caesarean delivery because multiple factors may contribute to blood loss. Adhesions can increase the difficulty of dissection, while abnormal

placentation and placenta previa can produce significant obstetric haemorrhage. In the present study, the occurrence of haemorrhage increased with the number of previous caesarean sections, with haemorrhage documented in 20% of women with two previous caesarean sections compared with 3.4% with one previous caesarean section.^[14,15]

Bladder Injury

Bladder injury occurred in 6 women (3%) in the present study. The thesis reported that three cases involved serosal injury and three involved complete bladder injury. All injuries were repaired, and the affected women subsequently recovered without reported urinary leakage. Catheterisation was continued for 14 days in these cases.^[16]

Bladder injury is a recognized complication of repeat caesarean delivery, particularly when adhesions distort the normal anatomical relationship between the bladder and lower uterine segment. The increasing frequency of bladder injury with repeated caesarean delivery therefore represents an important consideration during operative planning and dissection.^[17]

Placental Complications and Hysterectomy

Two cases of placenta percreta were documented in the study. One occurred in a woman undergoing her second caesarean section and the other in a woman undergoing her third caesarean section. Both cases were associated with placenta previa and required peripartum hysterectomy.

Two hysterectomies were performed in the present study, both because of placenta percreta with uncontrolled haemorrhage. One occurred in a woman with one previous caesarean section and the other in a woman with two previous caesarean sections.^[18]

These observations demonstrate the potential severity of abnormal placentation in women with previous uterine scars. Although the number of cases in the present study was small, the occurrence of placenta percreta and hysterectomy represents an important component of the operative morbidity associated with repeat caesarean delivery.^[19]

Emergency and Elective Repeat Caesarean Section

Of the 200 repeat caesarean sections, 107 (53.5%) were elective and 93 (46.5%) were emergency procedures. Intraoperative complications were recorded in 28 emergency cases (30.1%) and 28 elective cases (26.1%).

The study therefore demonstrated intraoperative complications in both emergency and elective repeat caesarean deliveries. The difference in the recorded proportions was relatively small, although the clinical circumstances leading to emergency surgery may influence operative difficulty and maternal and neonatal outcomes.^[20]

Postoperative Febrile Morbidity

Postoperative febrile morbidity was an important postoperative outcome in the present study. Urinary tract infection was the most frequently recorded cause, occurring in 12 women (6%), followed by wound infection in 8 women (4%). Endometritis and upper respiratory tract infection were each recorded

in 3 women (1.5%), while lower respiratory tract infection occurred in 1 woman (0.5%) and an unidentified cause was recorded in 2 women (1%). Urinary tract infection occurred in 4.6% of women with one previous caesarean section and 1.6% of those with two previous caesarean sections. Endometritis occurred in 1% of the study population, while wound infection occurred in 4%.

The occurrence of postoperative infection remains clinically relevant following repeat caesarean delivery, particularly when prolonged surgery, adhesiolysis, blood loss or other operative complications are present.^[21] In the present study, wound infection was also observed among women with higher BMI and in one woman with gestational diabetes mellitus.

Postoperative Hospital Stay

Prolonged postoperative hospital stay was observed in 15.6% of women with one previous caesarean section and 24% of those with two previous caesarean sections. The study therefore demonstrated a greater proportion of prolonged hospital stay among women with two previous caesarean sections.

The longer postoperative stay may reflect the greater operative morbidity associated with repeated caesarean delivery, including adhesions, wound infection, febrile morbidity, haemorrhage and other complications requiring additional observation or treatment.^[22]

Neonatal Outcomes and NICU Admissions

NICU admission was recorded in 48 neonates, representing 24% of the study population. The most frequent indication was unconjugated hyperbilirubinemia (12 cases, 25%), followed by hypoxic-ischaemic encephalopathy (10, 20.8%), prematurity (8, 16.6%), late-onset sepsis (7, 14.5%) and early-onset sepsis (6, 12.5%). Hypoglycaemia and hypocalcaemia were each recorded in two cases, while Dandy-Walker syndrome was recorded in one case.

NICU admission was more frequent following emergency caesarean section than elective caesarean section, with 29 admissions (60.4%) following emergency procedures and 19 (39.5%) following elective procedures. The thesis reported a statistically significant association between type of caesarean section and NICU admission.^[23]

No perinatal deaths were reported in the present study. No fetal lacerations were documented either, despite the potential for such injuries during technically difficult caesarean delivery.

Overall Interpretation of Findings

The findings of the present study indicate that repeat caesarean delivery is associated with important maternal operative and postoperative morbidity. Adhesions were particularly prominent and increased with successive caesarean sections. Other complications, including thinned-out lower uterine segment, haemorrhage, scar dehiscence, bladder injury, placental complications and hysterectomy, were also documented.^[24]

The study further demonstrated postoperative febrile morbidity and prolonged hospital stay, while neonatal morbidity requiring NICU admission was also observed. The pattern of complications supports the importance of careful antenatal assessment, appropriate preoperative planning, anticipation of adhesions and abnormal placentation, availability of blood products and multidisciplinary preparedness when managing women undergoing repeat caesarean delivery.^[25]

The thesis concludes that appropriate prenatal care, adequate preoperative preparation, meticulous surgical technique and careful postoperative follow-up may help reduce morbidity associated with repeat caesarean section. It also emphasizes the importance of avoiding unnecessary primary caesarean sections because reduction in primary caesarean delivery can consequently reduce the population exposed to the cumulative risks associated with repeated caesarean procedures.

CONCLUSION

Repeat caesarean section was associated with significant maternal operative and postoperative morbidity in the present study of 200 women. Adhesions were the most frequently encountered intraoperative finding, with their occurrence increasing with successive caesarean sections. Other important intraoperative complications included a thinned-out lower uterine segment, haemorrhage, scar dehiscence, bladder injury, extension of the uterine incision, placental complications and hysterectomy.

The study demonstrated that the number of previous caesarean sections was associated with an increasing frequency of several operative complications. Women with multiple previous caesarean sections had higher recorded frequencies of adhesions, thinned-out lower uterine segment, haemorrhage and other operative difficulties. Postoperative morbidity included urinary tract infection, wound infection, endometritis and prolonged postoperative hospital stay.

Neonatal morbidity was also observed, with 48 neonates requiring NICU admission. The common indications for NICU admission were unconjugated hyperbilirubinemia, hypoxic-ischaemic encephalopathy, prematurity and neonatal sepsis. NICU admission was more frequently associated with emergency than elective repeat caesarean section. No perinatal deaths were reported in the study.

The findings emphasize that repeat caesarean section requires careful preoperative assessment and adequate preparation for potential operative difficulties. Particular attention is required in women with multiple previous caesarean sections because of the increased likelihood of adhesions and other surgical complications. Appropriate antenatal planning, availability of blood and surgical support,

meticulous operative technique and adequate postoperative surveillance are important components of care.

The study also highlights the importance of avoiding unnecessary primary caesarean sections wherever clinically appropriate, as reduction in the number of primary caesarean deliveries may reduce subsequent exposure to the cumulative operative risks associated with repeat caesarean section.

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