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Original Article

# RETROSPECTIVE ANALYSIS OF ANESTHETIC APPROACHES IN CESAREAN DELIVERIES INVOLVING PLACENTAL ANOMALIES

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**ABSTRACT**

**Objective**: Placental anomalies such as placenta previa and placenta accreta spectrum disorders pose significant challenges during cesarean deliveries due to the increased risk of massive obstetric hemorrhage. Optimal anesthetic management is crucial to enhance maternal and fetal outcomes in these high-risk situations.

**Methods**: A retrospective observational study was conducted at Gulbarga Institute of Medical Sciences, Kalaburagi, from January 2023 to January 2024. Sixty pregnant women diagnosed with placental anomalies were divided into two groups: Group P (n = 42) with placenta previa and Group A (n = 18) with placenta accreta spectrum disorders. Data on demographics, anesthetic techniques, intraoperative parameters, and postoperative outcomes were collected and analyzed using statistical methods appropriate for continuous and categorical variables.

**Results**: General anaesthesiology was administered more frequently in group a (96.4%) compared to group p (74.6%) ($p = 0.009$). Group A had a significantly longer duration of surgery s (80.53±26.02 min vs. 52.43±13.34 min, $p < 0.001$) and greater estimated blood loss (1582.14±790.71 ml vs. 685.82±262.82 ml, $p < 0.001$). They also required more blood transfusions and had longer durations of mechanical ventilation (75.14±43.84 hours vs. 4.74±20.78 hours, $p < 0.001$) and ICU stays (2.80±1.13 days vs. 0.50±1.10 days, $p < 0.001$).

**Conclusion**: Patients with placenta accreta spectrum disorders face higher intraoperative and postoperative risks compared to those with placenta previa. General anaesthesiology is often preferred in these cases due to the potential for massive hemorrhage. Individualized anesthetic plans are essential to manage the increased perioperative challenges effectively.

**Keywords**: Placenta previa, Placenta accreta spectrum, Cesarean section, Anesthetic techniques, Obstetric haemorrhage


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## INTRODUCTION

Cesarean delivery is one of the most commonly performed surgical procedures worldwide, and its prevalence has been steadily increasing over the past few decades [1]. Placental anomalies, such as placenta previa and placenta accreta spectrum disorders, significantly complicate cesarean deliveries due to the heightened risk of massive obstetric hemorrhage and associated maternal morbidity and mortality [2, 3]. Effective anesthetic management is crucial in optimizing both maternal and fetal outcomes in these high-risk cases [4].

Placenta previa occurs when the placenta partially or completely covers the internal cervical os, leading to bleeding complications during pregnancy and delivery [5]. Placenta accreta spectrum disorders, which include placenta accreta, increta, and percreta, are characterized by abnormal trophoblastic invasion into the uterine wall, potentially causing severe hemorrhage during placental separation [6]. The incidence of these anomalies has risen in parallel with increasing cesarean section rates and other uterine surgeries that may predispose to abnormal placental implantation [7].

Anesthetic approaches for cesarean deliveries complicated by placental anomalies primarily include regional anaesthesiology-such as spinal, epidural, or combined spinal-epidural techniques and general anaesthesiology [8]. The choice of anaesthesiology is influenced by several factors, including the severity of the placental disorder, anticipated blood loss, hemodynamic stability, and the urgency of the delivery [9]. Regional anaesthesiology offers advantages like maternal consciousness during delivery and reduced exposure of the fetus to depressant drugs, which may benefit neonatal outcomes [10]. However, general anaesthesiology may be preferred in cases where rapid airway control is necessary or when significant hemorrhage is anticipated, allowing for better hemodynamic management [11].

Previous studies have provided conflicting evidence regarding the optimal anesthetic technique for these patients. Some reports suggest that regional anaesthesiology is safe and effective in carefully selected patients with placenta previa or accreta, offering better postoperative pain control and reduced opioid consumption [12]. Others advocate for general anaesthesiology due to the potential for sudden hemodynamic instability and the need for immediate surgical intervention [13]. Given the lack of consensus and the limited data specific to different populations, institution-specific studies are essential to inform clinical practice.

This retrospective analysis aims to evaluate the anesthetic approaches used in cesarean deliveries involving placental anomalies at Gulbarga Institute of Medical Sciences, Kalaburagi. By assessing maternal and fetal outcomes associated with different anesthetic techniques, this study seeks to contribute to the optimization of anesthetic management in these high-risk obstetric cases.

## MATERIALS AND METHODS

### Study design and setting

This retrospective observational study was conducted at the Gulbarga Institute of Medical Sciences, Kalaburagi. The study period spanned from January 2023 to January 2024.

### Participants

A total of 60 pregnant women diagnosed with placental anomalies and scheduled for cesarean delivery were included in the study. The participants were divided into two groups based on their specific placental conditions:

- **Group P** (n = 42): Patients diagnosed with placenta previa.
- **Group A** (n = 18): Patients diagnosed with placenta accreta spectrum disorders.

### Inclusion criteria

- Pregnant women aged 18–45 y.

- Confirmed diagnosis of placenta previa or placenta accreta spectrum disorders via ultrasonography or magnetic resonance imaging.
- Scheduled for elective or emergency cesarean delivery.

**Exclusion criteria**

- Multiple pregnancies.
- Coagulopathies or other bleeding disorders.
- Severe systemic illnesses (e.g., uncontrolled hypertension, diabetes mellitus).
- Incomplete medical records.

**Data collection**

Data were retrieved from hospital electronic medical records and included:

- **Demographic Data**: Age, body mass index (BMI), gestational age at delivery.
- **Surgical Details**: Type of surgery (elective or emergency), duration of operation.
- **Anesthetic Management**: Type of anaesthesiology administered (general or spinal), intraoperative monitoring techniques.
- **Intraoperative Parameters**: Estimated blood loss, volume of crystalloids and colloids administered, blood products transfused.
- **Postoperative Outcomes**: Extubation status, duration of mechanical ventilation, length of intensive care unit (ICU) stay.

**Anesthetic techniques**

Anesthetic decisions were made by the attending anesthesiologist based on clinical judgment and the patient condition. General anaesthesiology was induced using standard agents (e. g., propofol, fentanyl) with neuromuscular blockade achieved via atracurium or rocuronium. Airway management involved endotracheal intubation with maintenance using inhalational agents like sevoflurane. Spinal anaesthesiology was performed at the L3–L4 interspace using hyperbaric bupivacaine.

**Statistical analysis**

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean±standard deviation and compared using the Student's t-test. Categorical variables were presented as frequencies and percentages analyzed using the chi-square test or Fisher's exact test when appropriate. A p-value of less than 0.05 was considered statistically significant.

**RESULTS**

**Patient demographics**

The study included 60 patients divided into Group P (n = 42) and Group A (n = 18). The demographic data are summarized in table 1. The mean age and BMI were comparable between the two groups. Gestational age at delivery was slightly lower in Group A (33.35 w) compared to Group P (35.82±3.53 w), but this difference was not statistically significant. Notably, the mean duration of surgery was significantly longer in Group A (80.53±26.02 min) than in Group P (52.43±13.34 min) ($p < 0.001$).

**Operative and anesthetic details**

As shown in table 2, emergency cesarean deliveries were more frequent in Group A (53.6%) compared to Group P (29.9%). The choice of anaesthesiology differed significantly between groups ($p = 0.009$). General anaesthesiology was administered to 96.4% of patients in Group A, significantly higher than the 74.6% in Group P. Conversely, spinal anaesthesiology was more commonly used in Group P (25.4%) than in Group A (3.6%).

**Intraoperative blood loss and fluid management**

The intraoperative findings are detailed in table 3. The estimated blood loss was significantly higher in Group A (1582.14±790.71 ml) compared to Group P (685.82±262.82 ml) ($p < 0.001$). Patients in Group A received a greater volume of crystalloids (1628.57±728.19 ml) than those in Group P (1098.50±297.20 ml), which was statistically significant ($p < 0.001$). Although colloid use was higher in Group A, the difference was not statistically significant. Blood product transfusions, including erythrocyte suspension and fresh frozen plasma, were markedly higher in Group A ($p < 0.001$ for both).

**Table 1: Demographic data of patients**

| Variable | Group P (n = 42) | Group A (n = 18) | p-value |
|---|---|---|---|
| Age (years) | 30.26±4.5 | 31.10±5.2 | 0.482 |
| BMI (kg/m$^2$) | 29.54±3.1 | 30.20±3.4 | 0.368 |
| Gestational age (weeks) | 35.82±3.53 | 33.35±4.1 | 0.074 |
| Duration of surgery (minutes) | 52.43±13.34 | 80.53±26.02 | <0.001* |

*Quantitative data are presented as mean±standard deviation. BMI: body mass index. *$p < 0.05$ indicates statistical significance.

**Table 2: Anesthetic and surgical procedures applied during operation**

| Variable | Group P (n = 42) | Group A (n = 18) | p-value |
|---|---|---|---|
| Type of operation | | | |
| -Emergency | 13 (29.9%) | 10 (53.6%) | 0.081 |
| -Elective | 29 (70.1%) | 8 (46.4%) | |
| Type of anaesthesiology | | | 0.009* |
| -General Anaesthesiology | 31 (74.6%) | 17 (96.4%) | |
| -Spinal Anaesthesiology | 11 (25.4%) | 1 (3.6%) | |

*Categorical data are presented as number (percentage). *$p < 0.05$ indicates statistical significance.

**Table 3: Intraoperative blood loss and fluid management**

| Variable | Group P (n = 42) | Group A (n = 18) | p-value |
|---|---|---|---|
| Estimated blood loss (ml) | 685.82±262.82 | 1582.14±790.71 | <0.001* |
| Crystalloids administered (ml) | 1098.50±297.20 | 1628.57±728.19 | <0.001* |
| Colloids administered (ml) | 188.85±262.07 | 267.85±318.62 | 0.178 |
| Erythrocyte suspension transfused (ml) | 154.35±355.05 | 1189.35±884.70 | <0.001* |
| Fresh frozen plasma transfused (ml) | 14.80±63.20 | 300.00±280.00 | <0.001* |

*Quantitative data are presented as mean±standard deviation. *$p < 0.05$ indicates statistical significance.

**Postoperative outcomes**

Postoperative data are summarized in table 4. A significant difference was observed in extubation rates; 97% of patients in Group P were extubated immediately after surgery compared to 60.7% in Group A. The need for postoperative mechanical ventilation was higher in Group A, with an average duration of 75.14±43.84 h versus 4.74±20.78 h in Group P ($p < 0.001$). Additionally, patients in Group A had a longer ICU stay (2.80±1.13 d) compared to Group P, where ICU stay data were not significant due to most patients not requiring ICU admission ($p < 0.001$).

**Table 4: Postoperative outcomes**

| Variable | Group P (n = 42) | Group A (n = 18) | p-value |
|---|---|---|---|
| Extubation in an operating room | 41 (97.0%) | 11 (60.7%) | 0.001* |
| Mechanical ventilation duration (h) | 4.74±20.78 | 75.14±43.84 | <0.001* |
| ICU length of stay (days) | 0.50±1.10 | 2.80±1.13 | <0.001* |

*Quantitative data are presented as mean±standard deviation. ICU: intensive care unit. *$p < 0.05$ indicates statistical significance.

**Extubation and ICU admission**

At the conclusion of surgery, a significantly higher proportion of patients in group a required continued mechanical ventilation and ICU admission. Specifically, 7 patients (39.3%) in Group A were transferred to the ICU while still intubated, compared to only 1 patient (2.4%) in Group P. The prolonged mechanical ventilation and ICU stays in group a highlight the increased postoperative care needs associated with placenta accreta spectrum disorders.

## DISCUSSION

This study provides a comparative analysis of anesthetic approaches and perioperative outcomes in cesarean deliveries complicated by placenta previa and placenta accreta spectrum disorders. The findings highlight significant differences in intraoperative blood loss, anesthetic choices, and postoperative recovery between the two groups.

The preference for general anaesthesiology in patients with placenta accreta spectrum disorders (96.4% in Group A) aligns with existing literature, suggesting that general anaesthesiology allows for better control of the airway and hemodynamics during potential massive hemorrhage [1, 9]. The increased duration of surgery and estimated blood loss in Group A reflect the complexity of surgical management in these patients. Similar studies have reported that placenta accreta spectrum is associated with prolonged surgeries and higher transfusion requirements due to invasive placental implantation [6, 12].

In contrast, a substantial proportion of patients with placenta previa (25.4% in Group P) underwent cesarean delivery under spinal anaesthesiology. Regional anaesthesiology offers benefits such as reduced neonatal exposure to anesthetic agents and better postoperative analgesia [10]. However, the risk of sudden hemodynamic instability may limit its use in cases where significant bleeding is anticipated [13].

The significantly higher need for blood transfusions and longer ICU stays in Group A underscores the severe perioperative challenges posed by placenta accreta spectrum disorders. The mean estimated blood loss in Group A was more than double that of Group P, necessitating aggressive fluid resuscitation and blood product administration. These findings are consistent with prior research indicating that placenta accreta spectrum is a leading cause of peripartum hysterectomy and maternal morbidity [3, 7].

One notable aspect is the higher rate of emergency cesarean deliveries in Group A (53.6%) compared to Group P (29.9%), although this difference did not reach statistical significance ($p = 0.081$). Emergency surgeries may contribute to increased risks due to less time for preoperative optimization. The importance of antenatal diagnosis and planned delivery in specialized centers cannot be overstated for patients with placenta accreta spectrum disorders [2, 5].

The study's retrospective design is a limitation, as it may introduce selection bias and limit the ability to establish causality. Additionally, the sample size, particularly for Group A, is relatively small, which may affect the generalizability of the results. Future prospective studies with larger cohorts are needed to validate these findings and develop standardized anesthetic protocols.

Despite these limitations, the study provides valuable insights into the anesthetic management of cesarean deliveries complicated by placental anomalies in a specific regional context. It highlights the need for multidisciplinary planning involving obstetricians, anesthesiologists, and transfusion services to optimize outcomes for these high-risk patients.

## CONCLUSION

Placenta accreta spectrum disorders significantly increase intraoperative risks compared to placenta previa, necessitating a tailored anesthetic approach. General anaesthesiology is often preferred in these cases due to the potential for massive hemorrhage and prolonged surgery. Effective perioperative management, including preparedness for extensive blood loss and postoperative care, is crucial. Multidisciplinary collaboration is essential to improve maternal and fetal outcomes in cesarean deliveries involving placental anomalies.

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Nil

## AUTHORS CONTRIBUTIONS

All authors have contributed equally

## CONFLICT OF INTERESTS

Declared none

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