



Original Article

A Retrospective Analysis of Difficult Airway Management During Obstetric General Anaesthesia and Associated Maternal and Neonatal Outcomes

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ABSTRACT

Background: Obstetric general anaesthesia (GA) is associated with an increased risk of difficult airway due to physiological changes of pregnancy and emergency operative conditions. Difficult airway events can significantly impact both maternal and neonatal outcomes.

Aim: To analyse the incidence, nature, management, and outcomes of difficult airways encountered during obstetric GA and their associated maternal and neonatal outcomes.

Material and Methods: This retrospective observational study was conducted in the Department of Anaesthesiology, Yadgiri Institute of Medical Sciences, Yadgir, from January 2017 to December 2019. A total of 60 obstetric patients who underwent GA and encountered a difficult airway were included. Data were collected from anaesthesia records, obstetric files, and ICU records. Variables included demographic profile, airway characteristics, management techniques, intraoperative complications, and maternal and neonatal outcomes. Data were analysed using descriptive statistics.

Results: Most patients were aged 21–30 years, and 83.3% underwent emergency caesarean section. Difficult airway was reflected by higher Cormack–Lehane grades (Grade III–IV in 53.3%) and multiple laryngoscopy attempts in 70% of cases. Bougie-assisted intubation was the most common adjunct technique (33.3%), followed by LMA use (16.7%). Maternal complications included hypotension (30%), hypoxia (20%), airway trauma (10%), and aspiration (6.7%). ICU admission was required in 16.7% of cases, with maternal mortality of 1.7%. Neonatal outcomes showed low Apgar score at 1 minute in 36.7% and NICU admission in 30% of newborns.

Conclusion: Difficult airway during obstetric GA is associated with significant maternal and neonatal morbidity. Early recognition, skilled airway management, and adherence to difficult airway protocols are essential to improve outcomes.

Keywords: Obstetric general anaesthesia; Difficult airway; Cormack–Lehane grade; Caesarean section; Airway management; Bougie-assisted intubation; Supraglottic airway device; Maternal outcome; Neonatal outcome; Apgar score.

INTRODUCTION

Obstetric general anaesthesia (GA), though now less frequently used due to the widespread adoption of regional techniques, remains an essential component of emergency caesarean delivery and situations where regional anaesthesia is contraindicated or fails. In such scenarios, airway management becomes a critical determinant of maternal and neonatal outcomes. Pregnancy is associated with significant physiological and anatomical changes, including upper airway oedema, weight gain, reduced functional residual capacity, and increased oxygen consumption, all of which predispose to rapid desaturation and increased difficulty in airway management during anaesthesia induction [1,2].

Difficult airway in obstetric patients is particularly concerning because it combines a high-risk airway with a full stomach, increased aspiration risk, and time-sensitive foetal considerations. Failed or difficult tracheal intubation during obstetric anaesthesia remains a leading cause of anaesthesia-related morbidity and mortality worldwide [3]. Despite advances in airway devices and guidelines, obstetric airway emergencies continue to pose significant challenges, especially in resource-limited settings and emergency operative conditions.

The incidence of difficult intubation in obstetric patients is reported to be higher compared to the general surgical population, primarily due to physiological airway changes and limited time for thorough pre-anaesthetic evaluation in emergencies [4]. Furthermore, repeated laryngoscopy attempts and failed intubation may result in hypoxia, aspiration, haemodynamic instability, and adverse neonatal outcomes, including low Apgar scores and increased NICU admissions [5].

Modern airway management strategies such as bougie-assisted intubation, supraglottic airway devices (e.g., LMA), and adherence to difficult airway algorithms have improved safety; however, their effectiveness is highly dependent on timely recognition and skilled application [6]. The association between difficult airway events and maternal–neonatal outcomes in obstetric GA cases remains an important area of clinical audit and quality improvement.

In this context, the present retrospective observational study was undertaken to analyze cases of difficult airway management during obstetric general anaesthesia and to evaluate associated maternal and neonatal outcomes in a tertiary care teaching hospital.

MATERIAL AND METHODS

Study Design

This study was designed as a retrospective observational analysis of cases of difficult airway management encountered during obstetric general anaesthesia and their associated maternal and neonatal outcomes.

Study Setting

The study was conducted in the Department of Anaesthesiology, Yadgiri Institute of Medical Sciences (YIMS), Yadgir, Karnataka, India, a tertiary care teaching hospital providing emergency and elective obstetric services.

Study Period

The study was carried out over a three-year period from January 2017 to December 2019.

Study Population

All obstetric patients who underwent general anaesthesia for caesarean section or obstetric surgical procedures and in whom difficult airway management was encountered were included in the study.

Sample Size

A total of 60 cases fulfilling the inclusion criteria of difficult airway during obstetric general anaesthesia were included in the analysis.

Inclusion Criteria

- Obstetric patients who received general anaesthesia for emergency or elective obstetric procedures
- Cases in which difficult airway management was encountered (e.g., difficult intubation, failed intubation, multiple laryngoscopy attempts, use of airway adjuncts or alternative airway techniques)
- Complete anaesthesia and obstetric records available for review

Exclusion Criteria

- Obstetric patients managed exclusively under regional anaesthesia without conversion to general anaesthesia
- Incomplete or missing anaesthesia records
- Non-obstetric surgical cases

Data Collection

Data were collected retrospectively from:

- Anaesthesia records
- Obstetric case files
- Operation theatre registers
- Postoperative recovery and intensive care unit records

The following variables were recorded:

- Maternal demographic details (age, parity, ASA status if available)

- Indication for general anaesthesia
- Airway assessment details (if documented)
- Nature of difficult airway (Cormack–Lehane grade, failed intubation, number of attempts, use of bougie, laryngeal mask airway, or other rescue techniques)
- Anaesthetic technique and drugs used
- Intraoperative complications (hypoxia, hypotension, aspiration, airway trauma)
- Maternal outcomes (ICU admission, morbidity, mortality)
- Neonatal outcomes (Apgar score at 1 and 5 minutes, need for resuscitation, NICU admission)

Outcome Measures

- Primary outcome: Incidence and nature of difficult airway events during obstetric general anaesthesia
- Secondary outcomes: Maternal complications and neonatal outcomes associated with difficult airway situations

Statistical Analysis

Data were entered and analysed using Microsoft Excel. Continuous variables were expressed as mean $\pm$ standard deviation or median, while categorical variables were presented as frequencies and percentages. The results were summarised in tables and graphs for clear interpretation.

RESULTS / OBSERVATIONS

A total of 60 obstetric patients with difficult airway management during general anaesthesia were included in this retrospective study conducted from 2017 to 2019 at YIMS, Yadgir. Data were analyzed with respect to demographic profile, obstetric characteristics, airway difficulty parameters, management techniques, and maternal and neonatal outcomes.

Most cases occurred in younger age groups and were predominantly emergency LSCS. Difficult airway was mainly reflected by higher Cormack–Lehane grades and increased laryngoscopy attempts. Various airway adjuncts and rescue techniques were used as required. Maternal and neonatal outcomes showed variable complications, which are detailed in the following tables.

Table 1: Demographic Profile of Study Patients

Variable	Category	Number (n=60)	Percentage (%)
Age (years)	<20	8	13.3%
	21–25	22	36.7%
	26–30	18	30%
	31–35	8	13.3%
	>35	4	6.7%
ASA Status	I	10	16.7%
	II	38	63.3%
	III	12	20%

Table 2: Obstetric Characteristics

Variable	Category	Number (n=60)	Percentage (%)
Parity	Primigravida	28	46.7%
	Multigravida	32	53.3%
Type of LSCS	Emergency	50	83.3%
	Elective	10	16.7%
Indication for GA	Fetal distress	24	40%
	Failed spinal	18	30%
	Eclampsia/others	18	30%

Table 3: Airway Assessment and Difficulty Parameters

Variable	Category	Number (n=60)	Percentage (%)
Cormack–Lehane Grade	Grade I	10	16.7%
	Grade II	18	30%
	Grade III	20	33.3%
	Grade IV	12	20%
Laryngoscopy Attempts	1 attempt	18	30%
	2 attempts	24	40%
	≥ 3 attempts	18	30%

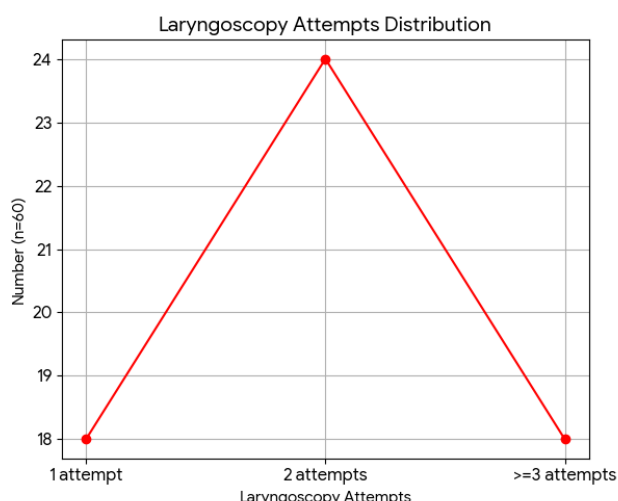
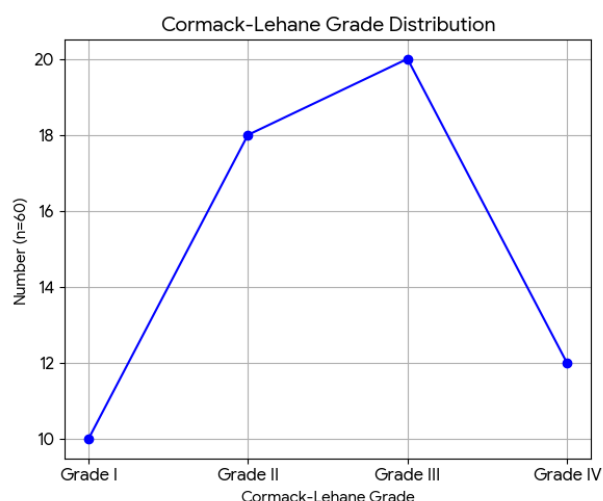


Table 4: Airway Management Techniques Used

Technique Used	Number (n=60)	Percentage (%)
Direct laryngoscopy only	18	30%
Bougie assisted intubation	20	33.3%
Stylet use	8	13.3%
LMA (rescue airway)	10	16.7%
Failed intubation / alternate airway	4	6.7%

Table 5: Intraoperative Maternal Complications

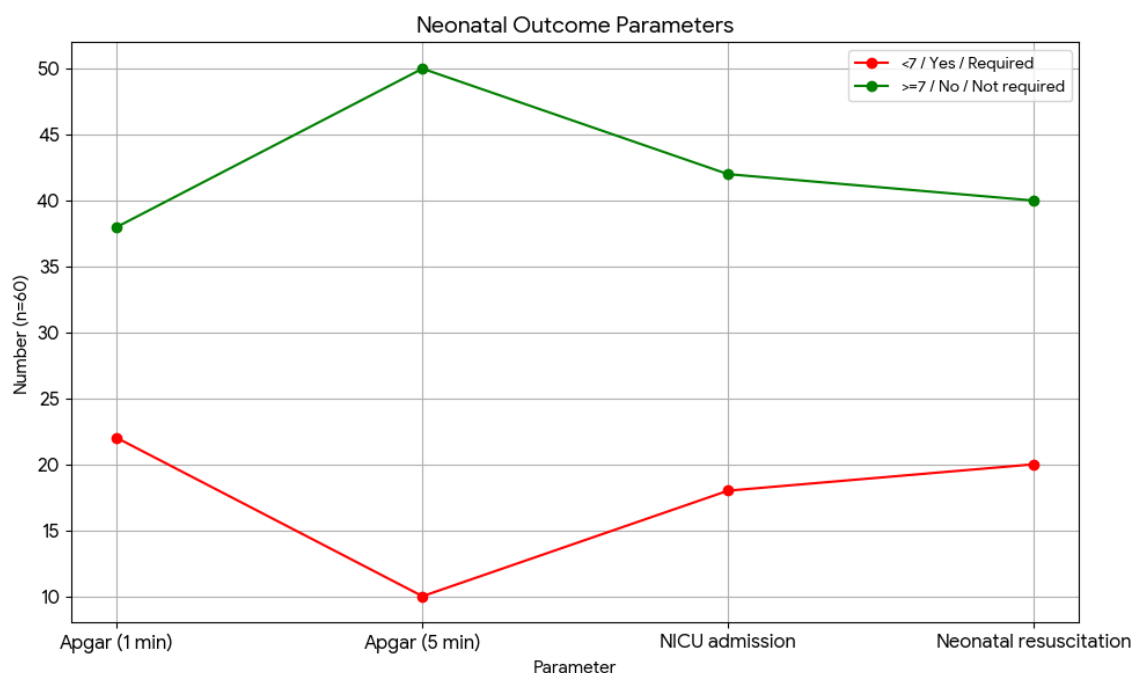
Complication	Number (n=60)	Percentage (%)
Hypoxia (SpO ₂ <90%)	12	20%
Hypotension	18	30%
Aspiration	4	6.7%
Airway trauma	6	10%
None	20	33.3%

Table 6: Maternal Outcome

Outcome	Number (n=60)	Percentage (%)
ICU admission	10	16.7%
Prolonged ventilation	6	10%
Maternal morbidity	8	13.3%
Maternal mortality	1	1.7%
Uneventful recovery	45	75%

Table 7: Neonatal Outcome

Parameter	Category	Number (n=60)	Percentage (%)
Apgar score (1 min)	<7	22	36.7%
	≥7	38	63.3%
Apgar score (5 min)	<7	10	16.7%
	≥7	50	83.3%
NICU admission	Yes	18	30%
	No	42	70%
Neonatal resuscitation	Required	20	33.3%
	Not required	40	66.7%



DISCUSSION

Airway management in obstetric anaesthesia remains one of the most critical challenges in anaesthetic practice. The present study analyzed 60 cases of difficult airway encountered during obstetric general anaesthesia over a three-year period, highlighting patterns of airway difficulty, management strategies, and associated maternal and neonatal outcomes. In this study, the majority of cases were emergency lower segment caesarean sections (83.3%), reflecting the well-established fact that obstetric airway emergencies are more commonly encountered in urgent situations where rapid sequence induction is required and preoperative optimization is limited. Similar findings have been reported by Kuczkowski et al., who emphasized that emergency obstetric anaesthesia significantly increases airway-related risks due to inadequate fasting status and limited airway evaluation time [7].

The distribution of Cormack–Lehane grades in our study showed a significant proportion of Grade III and IV views (53.3%), indicating a high incidence of difficult laryngoscopy. This is consistent with literature suggesting that obstetric patients have a higher likelihood of difficult laryngoscopic view due to airway oedema and reduced neck mobility [8]. Multiple laryngoscopy attempts (≥ 2 attempts in 70% cases) further contributed to increased hypoxic episodes and haemodynamic instability.

Bougie-assisted intubation was the most commonly used adjunct technique in our study (33.3%), followed by LMA rescue use (16.7%). The use of bougie as a first-line adjunct in difficult laryngoscopy is strongly supported by the Difficult Airway Society guidelines, which recommend early use to improve first-pass success rates [9]. Supraglottic airway devices such as LMA played a critical rescue role in failed intubation scenarios, preventing progression to severe hypoxia and “cannot intubate, cannot ventilate” situations [10].

Maternal complications observed in the present study included hypotension (30%), hypoxia (20%), airway trauma (10%), and aspiration (6.7%). These findings are comparable to those reported in large obstetric anaesthesia audits, where difficult airway events were strongly associated with hypoxic episodes and aspiration risk [11]. The relatively high rate of hypotension may be attributed to emergency induction conditions, use of induction agents, and haemodynamic instability in obstetric patients.

Maternal ICU admission rate (16.7%) and morbidity (13.3%) in this study highlight the clinical significance of difficult airway events. Although maternal mortality was low (1.7%), even a single case underscores the life-threatening nature of airway complications in obstetric anaesthesia. Worldwide reports indicate that failed airway remains a major contributor to anaesthesia-related maternal mortality, particularly in low-resource settings [12].

Neonatal outcomes were also affected, with 36.7% of neonates having Apgar scores <7 at 1 minute and 30% requiring NICU admission. However, most neonates showed improvement at 5 minutes, suggesting that timely neonatal resuscitation and obstetric intervention mitigated long-term adverse effects. Similar observations have been reported by Hawkins et al., who demonstrated a direct correlation between prolonged maternal hypoxia during airway difficulty and neonatal depression [13].

The findings of this study reinforce the importance of early recognition of difficult airway predictors, strict adherence to difficult airway algorithms, and readiness with alternative airway devices. Simulation training, multidisciplinary preparedness, and rapid decision-making are essential to reduce both maternal and neonatal morbidity in obstetric anaesthesia practice.

Overall, this study highlights that although difficult airway events in obstetric GA are relatively infrequent, their consequences are potentially severe. Strengthening airway management protocols and ensuring availability of advanced airway devices in obstetric theatres can significantly improve outcomes.

CONCLUSION

Difficult airway during obstetric general anaesthesia remains a serious clinical challenge, particularly in emergency caesarean sections. In this study, higher Cormack–Lehane grades, multiple laryngoscopy attempts, and frequent need for airway adjuncts were common findings. These events were associated with significant maternal complications such as hypoxia, hypotension, ICU admission, and rare mortality, as well as adverse neonatal outcomes including low Apgar scores and increased NICU admissions.

Early anticipation, strict adherence to difficult airway algorithms, and timely use of adjunct airway devices are essential to improve maternal and neonatal safety in obstetric anaesthesia practice.

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