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Anaesthesia Management for Pregnant Women Undergoing Laparoscopic Appendectomy: A Descriptive Study

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Abstract

A cross-sectional, descriptive study was conducted in the Department of Anaesthesiology, Community Based Medical College, Bangladesh (CBMC,B), Mymensingh & three Specialist Private hospital of Mymensingh, Bangladesh, from January 2022 to December 2024, to observe how anesthesia management is operating for pregnant patients undergoing laparoscopic appendectomy. A total of 63 purposively selected pregnant patients were included in this study. Data regarding patients' age, gestational age, ASA status, anaesthesia techniques, medications, intraoperative and postoperative monitoring, and maternal-fetal outcomes were observed, recorded and analyzed. The mean age of the patients was 26.5±4.2 years; most of them were in their second trimester (58.7%). General anaesthesia with endotracheal intubation was used in 92.1% of cases. Propofol (87.3%) and succinylcholine (100%) were primary agents. Stable haemodynamics were maintained in 88.9% of patients. No major maternal and fetal complications was observed. The mean duration of surgery was 45.2±12.3 minutes, while the mean anesthesia time was 68.5±15.7 minutes and postoperative mean time to extubation was 8.2±3.1 minutes. Average stay in the post-anesthesia care unit was 95.4±22.6 minutes. Our data confirms the safety of general anesthesia for laparoscopic appendectomy in pregnancy, as proper monitoring was ensured. The favorable outcomes support current protocols, though standardized fetal monitoring still remains a bit challenging. Our findings are expected to aid further research on anesthetic management of non-obstetric surgeries in pregnant patients.

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Introduction

Appendicitis is one of the most common non-obstetric surgical emergencies during pregnancy, with an estimated incidence of 1 in 500 to 1 in 2000 pregnancies.[1,2] If left untreated, it can lead to severe complications such as perforation, peritonitis, and preterm labor, posing significant risks to both the mother and fetus.[2-4] Laparoscopic appendectomy has become the preferred surgical approach due to its advantages over open surgery, including reduced postoperative pain, faster recovery, and lower infection rates.[5,6] However, anesthesia management in pregnant patients undergoing this procedure presents unique challenges due to the physiological changes of pregnancy and the need to ensure fetal safety.[7] Pregnancy induces significant cardiovascular, respiratory, and gastrointestinal alterations that influence anesthetic management.[8] The gravid uterus can cause aortocaval compression, leading to hypotension, while increased oxygen demand and reduced functional residual capacity heighten the risk

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of hypoxia.[9,10] Additionally, the teratogenic risks of certain anesthetic agents and the potential for uterine irritability due to pneumoperitoneum during laparoscopy necessitate careful drug selection and monitoring.[11,12] General anesthesia with endotracheal intubation is commonly employed to secure the airway and minimize aspiration risk, though regional anesthesia techniques, such as spinal or epidural, have also been explored in select cases.[9,13,14] Despite advancements in surgical and anesthetic techniques, there remains a lack of standardized protocols for managing pregnant patients undergoing laparoscopic appendectomy, particularly in low-resource settings.[15]

Existing studies predominantly focus on non-pregnant populations or open surgical approaches, leaving a gap in evidence-based guidelines for this specific patient group.[16,17] In Bangladesh, where healthcare infrastructure varies widely, understanding local anesthesia practices and outcomes is crucial for improving perioperative care.[18] This study aims to see the anaesthesia management strategies employed for pregnant patients undergoing laparoscopic appendectomy. By analyzing anaesthetic techniques, monitoring practices, and maternal-fetal outcomes, this research seeks to contribute to the limited body of literature on this topic and provide insights for optimizing perioperative care in similar settings. The findings may assist anaesthesiologists in making informed decisions to enhance patient safety and surgical outcomes in this high-risk population.

Methods

This cross-sectional, descriptive study was conducted in the Department of Anaesthesiology, Community Based Medical College, Bangladesh (CBMC,B), Mymensingh Medical Collage & three Specialist Private hospital of Mymensingh, from January 2022 to December 2024. A total of 63 pregnant patients undergoing laparoscopic appendectomy were included using purposive sampling to ensure representation of diverse gestational ages and anesthetic approaches. Data was collected including patients' age, gestational age, ASA status, anaesthesia technique, drugs used, haemodynamic status (intraoperative and postoperative) and maternal-fetal outcomes. General anaesthesia with endotracheal intubation was the primary technique, while a subset received spinal anaesthesia based on clinical assessment. Standard monitoring included ECG, SpO_2, non-invasive blood pressure (NIBP), end-tidal CO_2 ($EtCO_2$), and fetal heart rate (where applicable). Anaesthetic induction typically involved propofol and succinylcholine, with maintenance on sevoflurane or isoflurane. Intraoperative haemodynamic status, oxygen saturation, and fetal well-being were closely monitored.

Data was analyzed using Microsoft Excel and Word for descriptive statistics. The results were presented in tables. Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency and percentage.

Ethical approval was obtained from the Ethical Review Committee of Community Based Medical College, Bangladesh (CBMC,B), Mymensingh, Bangladesh. The study adhered to STROBE guidelines for observational research.

Results

The study included 63 pregnant women, the mean age was 26.5±4.2 years. The majority of patients (58.7%) were in their second trimester, while 34.9% were in their first trimester and only 6.4% were in the third trimester. Among them, 41(65%) were in ASA-I category, while the rest 22(35%) were in ASA-II category. Regarding anesthesia techniques, general

anesthesia with endotracheal intubation was the predominant choice (92.1%), while spinal anesthesia was used in the remaining cases (7.9%) (Table-I).

Table-I: Distribution of anaesthesia techniques

Anaesthesia technique	Frequency (Percentage)
General anesthesia with ETT	58 (92.1%)
Spinal anesthesia	5 (7.9%)

The distribution of anesthetic agents showed that propofol was the most common induction agent (87.3%), followed by thiopental (12.7%). For muscle relaxation, succinylcholine was used in all cases (92.1%) of general anesthesia (Table-II).

Table-II: Anaesthetic agents used

Anaesthetic agents	Frequency (Percentage)
Induction agents	
Propofol	55 (87.3%)
Thiopental	8 (12.7%)
Muscle relaxants	
Succinylcholine	58 (92.1%)
Maintenance agents	
Sevoflurane	52 (82.5%)
Isoflurane	6 (9.5%)

Intraoperative monitoring practices demonstrated that basic parameters like ECG, SpO_2, and NIBP were monitored in all cases. $EtCO_2$ monitoring was performed in 92.1% of cases, while fetal heart rate monitoring was conducted in 68.3% of patients. Maternal haemodynamic parameters remained stable in most cases, with only 11.1% experiencing transient hypotension that required vasopressor support (Table-III). The maternal outcomes were generally favourable; among maternal complications, nausea and vomiting were observed at postoperative units (14.3% and 4.8% cases respectively).

No cases of maternal mortality or severe morbidity were recorded. Fetal outcomes were similarly positive, with no fetal distress or fetal loss was reported (Table-IV). The mean duration of surgery was 45.2±12.3 minutes, while the mean anesthesia time was 68.5±15.7 minutes and postoperative mean time to extubation was 8.2±3.1 minutes. Average stay in the post-anesthesia care unit was 95.4±22.6 minutes (Table-V).

Table-III: Intraoperative haemodynamic status

Haemodynamic status	Frequency (Percentage)
Stable haemodynamics	56 (88.9%)
Transient hypotension	7 (11.1%)
Requiring vasopressors	7 (11.1%)

Table-IV: Maternal and fetal complications

Postoperative complications	Frequency (Percentage)
Maternal complications	
Nausea	9 (14.3%)
Vomiting	3 (4.8%)
Aspiration	-
Fetal complications	
Fetal distress	-
Fetal loss	-

Table-V: Surgical and anaesthesia time characteristics

Variables	Mean±SD (in minutes)	Range (in minutes)
Duration of surgery	45.2±12.3	30–85
Anesthesia time	68.5±15.7	45–110
Time to extubation	8.2±3.1	5–15
PACU stay	95.4±22.6	6–150

Discussion

Our study findings demonstrate that general anesthesia with endotracheal intubation was the predominant technique (92.1%), aligning with current

recommendations for non-obstetric surgery in pregnancy due to its ability to secure the airway and minimize aspiration risk.[18] The high preference for general anaesthesia over spinal techniques (7.9%) may reflect institutional protocols and surgeon-anaesthesiologist preferences in managing pneumoperitoneum during laparoscopy.[12] The demographic profile showed most patients were in their second trimester (58.7%), consistent with literature suggesting appendicitis occurs most frequently during this period.[19] The mean age of 26.5 years reflects younger maternal population of Bangladesh.[20] ASA-I status predominance (65.1%) indicates most patients were healthy before surgery, which likely contributed to favourable outcomes. Propofol was the primary induction agent (87.3%), supported by its rapid onset, short duration, and favourable fetal safety profile.[21] Succinylcholine's universal use for neuromuscular blockade aligns with its rapid action and short duration, ideal for rapid-sequence intubation.[22] Sevoflurane (82.5%) was the preferred maintenance agent, likely due to its uterine relaxation properties and lower risk of fetal depression compared to other volatile anaesthetics.[23] Intraoperative monitoring practices were robust, with 100% adherence to ECG, SpO_2, and NIBP monitoring. $EtCO_2$ monitoring (92.1%) is critical in laparoscopy to prevent hypercapnia from CO_2 insufflation.[24] Fetal heart rate monitoring (68.3%) was performed less consistently, possibly due to procedural challenges or resource limitations. This contrasts with guidelines recommending continuous fetal monitoring when feasible.[25] Haemodynamic stability was maintained in 88.9% of cases, with transient hypotension (11.1%) managed effectively using vasopressors. These findings compare favorably with studies reporting 15–20% hypotension rates in pregnant patients undergoing Surgery.[26]

The absence of severe maternal complications or fetal adverse outcomes reinforces the safety of modern anaesthesia protocols when applied meticulously.[27] The mean surgery duration (45.2 minutes) and anaesthesia time (68.5 minutes) were comparable to global benchmarks.[28] Prolonged PACU stays (95.4 minutes) may reflect conservative postoperative monitoring policies for pregnant patients.[29]

The single-center design and small sample size limit generalizability. Purposive sampling may introduce selection bias, and the absence of a comparison group prevents causal inferences. Long-term fetal outcomes were not assessed.

Conclusion

This study demonstrates that laparoscopic appendectomy under general anesthesia is safe for pregnant patients when performed with meticulous monitoring and proper anesthetic techniques. The favorable maternal and fetal outcomes at Joy Hospital highlight the effectiveness of current protocols. However, standardized fetal monitoring and larger multicenter studies are needed to optimize perioperative care. These findings contribute valuable insights for managing non-obstetric surgeries in pregnancy, particularly in resource-limited settings. Future multicenter studies with larger samples should evaluate long-term fetal outcomes and compare regional versus general anesthesia. Standardized fetal monitoring protocols should be implemented.

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