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Original Research Article

Anesthetic Management and Outcomes of Emergency Cesarean Section in a Tertiary Hospital in Sub-Saharan Africa: A Retrospective Study in Bamako, Mali

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Abstract: *Introduction*: Obstetric emergencies are a major cause of maternal and foetal morbidity and mortality, particularly in sub-Saharan Africa where healthcare resources are limited. Emergency caesarean sections, whilst life-saving, are often performed under adverse conditions, requiring appropriate anaesthetic management. Improvements in anaesthetic techniques, particularly regional anaesthesia, have helped to reduce complications, but disparities persist between low- and high-income countries. ***Patients and Methods*:** This was a retrospective descriptive and analytical study conducted over a six-month period (1 August 2024 to 31 January 2025) at the 'Le Luxembourg' Mother and Child University Hospital in Bamako. The study included all women who underwent an emergency caesarean section with anaesthetic management. The variables studied included sociodemographic characteristics, surgical indications, anaesthetic techniques, perioperative incidents, and maternal and foetal outcomes. ***Results*:** Of the 191 caesarean sections performed, 77 were emergency caesarean sections, representing a rate of 40.31%. The mean age of the patients was 27.85 years. The main indications were acute foetal distress (26%), dystocia (19.5%) and severe pre-eclampsia (14.2%). Spinal anaesthesia was the most commonly used technique (75%), compared with 25% for general anaesthesia. Intraoperative complications were dominated by arterial hypotension (10.38%), haemorrhagic shock (6.4%) and nausea/vomiting (7.89%). Admission to the intensive care unit was required in 18.20% of patients. Perioperative maternal mortality was 3.89%. ***Discussion*:** The high frequency of emergency caesarean sections observed in our study reflects the difficulties in accessing routine obstetric care and delays in management, which are common in sub-Saharan Africa. Despite the predominant use of spinal anesthesia in line with international recommendations, the continued high use of general anesthesia highlights the severity of clinical situations and organizational constraints. Maternal morbidity and mortality remain high compared to developed countries, linked to delays in decision-making and delivery, limitations in technical facilities, and a shortage of human resources. These findings highlight the need to improve healthcare systems, in particular by strengthening antenatal care, optimizing referral pathways and training staff.

Keywords: Emergency Cesarean Section, Obstetric Anesthesia, Maternal Mortality, Sub-Saharan Africa, Low-Resource Settings.

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INTRODUCTION

An obstetric emergency is defined as any situation that poses an immediate threat to the life or functional well-being of the mother and/or the foetus. Caesarean section is associated with maternal and foetal morbidity and mortality, which may sometimes require anaesthetic management. This is why clinicians must be aware of the specific features of this management. The anaesthetic strategy obviously depends on maternal and

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obstetric characteristics, but primarily on the degree of urgency of the caesarean section [1]. Emergency caesarean sections are common and are among the absolute emergencies that anaesthetists may be called upon to manage. The increasingly systematic use of regional anaesthesia (RA) has significantly reduced obstetric morbidity and mortality [2]. Several techniques are available to us: spinal anaesthesia, epidural anaesthesia, combined spinal-epidural anaesthesia, and general anaesthesia. The choice of technique must take several factors into account: the degree of urgency, the presence or absence of effective epidural anaesthesia, and any known contraindications to one or other of the techniques. As always, a careful assessment of the risk-benefit balance is essential [2]. Obstetric emergencies are more common in developing countries, where they account for a high maternal mortality rate compared with developed countries: 239 deaths per 100,000 live births, compared with 12 deaths per 100,000 live births [3]. In Mali, most obstetric emergencies are managed in facilities where staff and technical resources are often inadequate. Despite the large number of referral centres, the 'Luxembourg' University Hospital remains one of the leading tertiary-level referral centres and the final resort. We therefore felt it necessary to initiate a study on the anaesthetic management of obstetric emergencies and its impact on maternal and foetal morbidity and mortality associated with such emergencies at the "LE LUXEMBOURG" Mother and Child University Hospital.

Objectives

The aim of this study was to examine the anaesthetic management of obstetric emergencies and its impact on maternal and foetal morbidity and mortality at the "Le Luxembourg" Mother and Child University Hospital in Bamako.

Patients and Methods

This was a descriptive, analytical study involving retrospective data collection, conducted over a period of six (6) months, from 1 August 2024 to 31 January 2025. It involved the medical records of all patients who received anaesthetic care for obstetric emergencies at the 'Luxembourg' Mother and Child University Hospital. Data were collected from medical and anaesthetic records. All non-obstetric emergencies and women undergoing elective caesarean sections were excluded.

Variables Studied:

- Sociodemographic characteristics: Age, parity, medical history, obstetric-surgical history, gestational age
- Type of obstetric emergency: Codes (Red, Orange, Green)
- Type of anaesthesia administered
- ASA classification
- Perioperative accidents and incidents
- Maternal-foetal prognosis and post-operative course

Ethical Considerations

Informed consent was obtained from the women giving birth for their participation in the study; data confidentiality was maintained at all stages of the study. The study protocol was submitted for approval to the local ethics committee of the 'LE Luxembourg' Mother and Child University Hospital.

Results

During the study period, 191 caesarean sections were performed; 77 of these were emergency caesarean sections, representing 40.31% of the total. The mean age of our patients was 27.85 years; the [31–38] age group accounted for 35.06% of the cohort. They were married in 75.32% of cases. The main indications for caesarean section were (**Table 1**): Acute foetal distress: 26%; Dystocia: 19.5%; Severe pre-eclampsia: 14.2%...

The time taken to deliver the foetus was ≤ 15 minutes in 15.58% of cases; it was ≥ 45 minutes in 5.19%; **Table 2** reports the various times taken for management in our series. General anaesthesia was administered in 25% of our parturients; 75% underwent surgery under spinal anaesthesia. Vascular fluid resuscitation at induction was performed in all parturients using Ringer's lactate. Noradrenaline was used to treat hypotension in all parturients. The main intraoperative incidents and events are reported in **Table 3**; these were: arterial hypotension: 10.38%; haemorrhagic shock: 6.4%; nausea and vomiting: 7.89%. The occurrence of perioperative incidents was statistically associated with the anaesthetic technique ($p \leq 0.0001$). Post-caesarean section intensive care was required in 18.20% of patients. We recorded a perioperative mortality rate of 3.89%.

Table I: Surgical indications

Operative indications	Frequencies	Percentages
Acute fetal distress	20	26.%
Dystocies	15	19,5%
Severe pre-eclampsia	11	14,2%
Eclampsie	5	6,5%
Pre-uterine rupture	5	6,5%
Scarred uterus in labor	3	3,9%
Retro placental haematoma	3	3,9%

Uterine rupture	3	3,9%
Haemorrhagic placenta previa	2	2,6%
Bleeding during labor	6	7,7%
Premature rupture of membranes	2	2,6%
Procidence of the beating cord	2	2,6%
Total	**77**	**100%**

Table II: Time taken to perform a caesarean section

Deadlines	Frequencies	Percentages
≤ at 15 minutes	12	15,58
≤ at 25 minutes	50	64,94
≤ at 35 minutes	11	14,29
≥ at 45 minutes	4	5,19
Total	**77**	**100**

Table III: Major adverse events

Adverse events	Frequencies	Percentages
Low blood pressure	8	10,39
State of hemorrhagic shock	5	6,49
Nausea/Vomiting	6	7,79
Chills	2	2,60
Wake-up delays	4	5,19
Total	**25**	**32,47**

DISCUSSION

Emergency caesarean sections are life-saving procedures, but they also serve as a sensitive indicator of the performance of maternal health systems. The findings of our study are set against a global backdrop characterised by significant disparities between sub-Saharan Africa and high-income countries, both in terms of access to care and the quality of anaesthetic and obstetric management.

In our series, emergency caesarean sections accounted for 40.31% of procedures. This finding is consistent with data from Africa, where the proportion of emergency caesarean sections frequently exceeds 50% and can reach 70–80% in certain settings [4].

Globally, the overall caesarean section rate is estimated at 21.1%, with a steady increase over recent decades [5]. However, this increase masks profound inequalities: whilst some countries exceed 40%, sub-Saharan Africa still has rates below 10% [6].

This paradox — a low overall rate but a high proportion of emergency caesarean sections — can be explained by:

- Limited access to routine antenatal care
- Inadequate antenatal care
- Delays in decision-making

The main indications identified in our study (acute foetal distress, dystocia, pre-eclampsia) are similar to those described in the international literature [7].

However, their clinical significance differs:

- In sub-Saharan Africa, acute foetal distress is often diagnosed late, due to the lack of continuous monitoring (CTG)
- Dystocia is frequently linked to prolonged, unsupervised labour
- Hypertensive disorders are often managed late

An African multicentre study showed that over 60% of patients arriving for emergency caesarean section already had severe complications [8].

Conversely, in developed countries, these situations are generally identified early thanks to:

- Regular antenatal care
- Access to imaging and foetal monitoring
- Better organisation of care

The decision-to-delivery time (DTL) is a key quality indicator. International guidelines recommend a time of ≤ 30 minutes in emergency situations [9].

In our study, only 15.58% of cases were delivered within ≤ 15 minutes, reflecting prolonged delays.A recent systematic review reports that only 10–20% of caesarean sections in Africa meet the 30-minute time limit [10], compared with 80–90% in developed countries [11].

The main factors associated with delays are: Unavailability of the operating theatre; Delays in obtaining consumables; Staff shortages: Delays in transfer.

These delays are directly linked to: an increased risk of neonatal asphyxia and higher perinatal mortality.

In our series, spinal anaesthesia was the most common method (75%), which is in line with international recommendations [12]. In sub-Saharan Africa: the use of general anaesthesia remains high (10–30%) [13]. These frequencies can be explained by: The extreme urgency of certain situations. A lack of expertise in regional anaesthesia. Organisational constraints.

However, general anaesthesia is associated with:

- An increased risk of difficult intubation
- An increased risk of aspiration
- Higher maternal mortality

The ASOS study showed that maternal mortality was significantly higher among patients operated on under general anaesthesia [14].

In our study, arterial hypotension was the most common complication (10.38%), followed by shock and gastrointestinal disturbances.

These results are comparable to those reported in the literature, where complications occur in 20–35% of caesarean sections in Africa [15]. Risk factors include: urgency of the procedure; unstable haemodynamic status; delayed management; limited resources.

By comparison, in developed countries: anaesthetic morbidity is low; serious complications are rare thanks to continuous monitoring and standardised protocols [16]. The perioperative mortality rate observed in our study (3.89%) is high but remains consistent with data from across Africa. According to a recent meta-analysis, the risk of maternal death following a caesarean section is 50 times higher in sub-Saharan Africa than in high-income countries [17]. The main causes are: haemorrhage; hypertensive disorders; anaesthetic complications; and sepsis. The maternal mortality ratio in sub-Saharan Africa is estimated at 545 per 100,000 live births, compared with fewer than 10 in developed countries [18].

Emergency caesarean section is strongly associated with a poor neonatal prognosis.

One study showed that: the risk of neonatal mortality is two to three times higher in cases of emergency caesarean section [19], neonatal mortality in sub-Saharan Africa is approximately 27–30 per 1,000 live births [18].

Explanatory factors include: delayed management; perinatal asphyxia; lack of neonatal resuscitation. In developed countries, these complications are rare thanks to: rapid management; high-performing neonatal intensive care units.

Our study has certain limitations: its retrospective nature; variable quality of medical records; absence of certain data (detailed Apgar score, neonatal follow-up); and its single-centre design. However, it accurately reflects the reality of practice in a referral centre in Mali. Improving the management of emergency caesarean sections in sub-Saharan Africa depends on:

- Reducing the time between decision and delivery
- Training staff in obstetric anaesthesia
- Improving technical facilities
- Access to antenatal care
- Strengthening referral systems

A systemic approach is essential to reduce maternal and foetal morbidity and mortality.

CONCLUSION

Emergency cesarean section remains a critical life-saving intervention but also a major determinant of maternal and neonatal outcomes in sub-Saharan Africa. In our study, the high proportion of emergency procedures (40.31%) reflects both the burden of obstetric complications and persistent limitations in antenatal care and timely access to health services. Although spinal anesthesia was the predominant technique, in line with international recommendations, the relatively high rate of general anesthesia highlights the severity of clinical presentations and ongoing system constraints. The observed maternal morbidity and mortality, including a mortality rate of 3.89%, remain substantially higher than those reported in high-income settings, underscoring persistent disparities in the quality of obstetric and anesthetic care. Delays in care, particularly in the decision-to-delivery interval, appear to play a central role in adverse outcomes. These delays, combined with limited resources, insufficient staffing, and restricted access to intensive care, contribute significantly to poor maternal and neonatal prognosis. Improving outcomes requires a comprehensive and context-specific approach, including strengthening antenatal care, optimizing referral systems, reducing delays in emergency management, and expanding access to safe and effective regional anesthesia. Investments in infrastructure, workforce training, and availability of essential resources are crucial to enhancing the safety of emergency obstetric care. Ultimately, reducing maternal and neonatal mortality in low-resource settings will depend on sustained health system strengthening and the implementation of evidence-based practices tailored to local realities.

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