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Anesthetic Management of Emergency Cesarean in Rural Areas of Senegal

Ndiaye Saliou[1*], Bah Mamadou Diawo[2], Ndiaye Babacar[3], Leye Papa Alassane[2]

[1]Anaesthesia and Intensive Care Unit, Thierno Birahim Ndao Hospital, Kaffrine, Senegal
[3]Anaesthesia and Intensive Care Unit, Saint-Louis Regional Hospital, Senegal
[2]Anaesthesia and Intensive Care Department, Cheikh Anta Diop University, Dakar, Senegal
[3]Anaesthesia and Intensive Care Unit, Dalal Jamm Hospital, Senegal

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***Corresponding author:** Ndiaye Saliou
Anaesthesia and Intensive Care Unit, Thierno Birahim Ndao Hospital, Kaffrine, Senegal

Abstract **Original Research Article**

Objectives: To determine the epidemiological profile, anesthetic technique and outcomes of patients who underwent anesthesia for emergency cesarean section in a rural African setting. ***Patients and methods:*** This was a retrospective study including all patients who underwent anesthesia for emergency cesarean section at the Kaffrine Regional Hospital Center from January 1, 2022, to December 31, 2022. ***Results:*** During the study, 280 women underwent anesthesia for emergency cesarean section, representing 22.85% of all cesarean sections. The mean age of the patients was 22 years. The most frequent surgical indications were gestational hypertension (38.88%) and dystocia (33.33%). A preoperative assessment was performed on all patients, in the majority of cases by a nurse anesthetist (86%). Spinal anesthesia was the most frequently used anesthetic technique (80.55%) and hyperbaric bupivacaine was the local anesthetic employed. The combination of propofol and suxamethonium was the predominant rapid sequence induction protocol used for general anesthesia. Perioperative incidents were mainly represented by hypotension. Blood transfusion was used in 5.90% of cases. Seventeen patients (5.90%) experienced postoperative complications. We noted three maternal deaths (1.04%). ***Conclusion:*** Emergency cesarean section is a frequent occurrence and a source of complications in our setting. A better understanding of anesthetic procedures would help reduce morbidity and mortality.

Keywords: Emergency Cesarean Section, Anesthetic Technique, Rural African Setting, Maternal Morbidity, Spinal Anesthesia, Gestational Hypertension.

INTRODUCTION

Obstetric emergencies are frequent and pose a management challenge in isolated situations with limited resources. Cesarean section has a higher morbidity and mortality rate than vaginal delivery, especially in emergency situations. The anesthesiologist remains a key player due to their involvement in all phases of the surgical procedure. The anesthetic procedure used is related to maternal and obstetric characteristics, but above all to the degree of urgency of the cesarean section [1]. The objective of our study was to describe the practice of anesthesia for emergency cesarean sections at the Kaffrine Regional Hospital in a rural area of Senegal.

MATERIALS AND METHODS

This is a descriptive and retrospective study conducted from January 1, 2022, to December 31, 2022, in the maternity and intensive care unit of the Thierno Birahim Ndao Hospital in Kaffrine, Senegal. We included all patients who underwent anesthesia for emergency cesarean section. We studied the epidemiology, surgical indication, anesthetic technique, and patient outcomes.

RESULTS

During our study period, 288 patients underwent emergency cesarean section under anesthesia. This represented 22.85% of all cesarean sections. The mean age of the patients was 22 years (range 16-45 years). Pregnancy was monitored in 80% of patients. Hypertension was the most common medical history, accounting for 6.9% of cases. Other pre-existing conditions included diabetes (1.38%), asthma (0.69%), ovarian cystectomy (0.34%), and sickle cell disease (0.34%). The minimum workup performed consisted of a complete blood count, blood typing, and blood coagulation studies. The surgical indications were primarily hypertensive disorders and dystocia. Table I

shows the distribution of patients according to the indication for cesarean section. A preoperative assessment was performed on all patients, in the majority of cases by a nurse anesthetist (86%). Antibiotic prophylaxis was administered to all patients. Two hundred and thirty-two patients (80.55%) underwent spinal anesthesia. Hyperbaric bupivacaine 0.5% (or with 25 mcg of fentanyl) administered intrathecally, was used for spinal anesthesia, with a mean dose of 8.65 mg (range 7.5 and 10 mg). It was combined with morphine in 25 patients (8.68%). Rapid sequence induction was used in all patients with general anesthesia (56 patients). The protocol administered was the combination of propofol and suxamethonium (36 patients) and ketamine and suxamethonium (20 patients). Tranexamic acid was used in 175 patients (60.7%) and ephedrine in 168 patients (43.4%). Intraoperative complications were predominantly hypotension. Table II shows the distribution of patients according to intraoperative complications. Seventeen (5.90%) patients received a blood transfusion. Extubation was performed in the operating room in 18 patients. Sixty patients (20.88%) were transferred to the intensive care unit, and the remainder to the post-anesthesia care unit of the maternity ward. The predominant postoperative analgesia protocol was a combination of paracetamol and tramadol. Intrathecal morphine was used in 25 patients (8.68%). Postoperative complications were noted. These included postpartum hemorrhage (10 cases), eclampsia (4 cases), pelvic peritonitis (1 case), and wound infection (2 cases). Maternal mortality was 1.04% (three patients).

Table 1: Distribution of patients according to the indication for cesarean section

Indications for cesarean	Number(n)	Percentage (%)
Preeclampsia syndrome	**112**	**38,88**
Severe preeclampsia	97	33,68
Eclampsia	15	5,20
Hemorrhagic disorders	**53**	**18, 40**
Placenta previa	8	2,77
Retroplacental hematoma	35	12,15
Uterine rupture	10	3,47
Dystocia	96	33,33
Others	**27**	**09, 37**
Acute fetal distress	23	7,98
Umbilical cord prolapse	03	1,04
Diabetic coma	01	0,34

PE: Prééclampsia,

Table II: Distribution of patients according to intraoperative complications

Intraoperative complications	Number (n)	Percentage (%)
Hypovolemic shock	95	32,98
Hemorrhagic shock	13	4,51
Seizures	01	0,34
Desaturation	01	0,34

Tableau III: Lucas classification according to the degree of urgency of cesarean section [4]

Ench Classification:	Red code	Orange code	Green code
Traction Time	less than 15 min,	Less than 30 min,	Less than 60 min
Indications	1-Umbilical cord prolapse 2-Uterine rupture 3-Fetal bradycardia > 10 min 4-Severe hemorrhage	1-Forceps failure 2-Significant fetal heart rate abnormalities	1-Dystocia 2-Induction failure
Type of Anesthesia	General anesthesia or "epidural extension"	« Extension péridurale » ou Rachianesthésie	« Extension péridurale » ou Rachianesthésie

DISCUSSION

The incidence of emergency cesarean was high in most African studies. It primarily affected young women under the age of 25. This demonstrates the need for well-organized anesthetic care and adequate healthcare facilities [2,3]. The greatest needs are found in the most resource-poor countries. These obstetric emergencies constitute a health problem and reflect the level of development of these countries' healthcare systems. In our series, the main indications for cesarean section were hypertensive disorders and dystocia. The degree of urgency of cesarean section is classified using three color codes (red, orange, green) based on maternal and fetal prognosis according to the Lucas classification. This classification also defines the anesthetic strategy to

be used in each situation. Table III shows the Lucas classification according to the degree of urgency of cesarean section [4]. In our study, this procedure did not appear to be followed due to the lack of adequate maternal-fetal monitoring resources, organizational problems, and the unavailability of certain medications. However, the fetal heart rate and the patient's hemodynamic status were assessed upon admission. The decision to use a particular anesthetic technique for a cesarean delivery must be individualized, based on anesthetic, obstetric, or fetal risk factors, the patient's preferences, and the anesthesiologist's judgment [5]. In our setting, the preoperative assessment was primarily performed by the nurse anesthetist. This strategy reduced the incidence of general anesthesia to 19.45%. General anesthesia may be the most appropriate choice in certain circumstances (profound fetal bradycardia, uterine rupture, severe hemorrhage, severe retroplacental hematoma, umbilical cord prolapse). General anesthesia with orotracheal intubation has advantages in emergency cesarean sections, such as a shorter induction-to-delivery time and less hypotension than regional anesthesia [5]. Effective preoxygenation is essential given the respiratory changes associated with pregnancy, with a target end-tidal oxygen fraction of 90% or higher [6]. Rapid sequence induction with thiopental and suxamethonium, in the absence of contraindications, using the Sellick maneuver, is recommended for this procedure [7]. Propofol, with its advantages such as rapid anesthesia and excellent recovery, can be an alternative to thiopental to limit its hemodynamic effects, including hypotension. In our study, the combination of propofol and suxamethonium was the most frequently used for anesthetic induction. Opioids are administered after umbilical cord clamping. In cases of severe preeclampsia, remifentanil may be used before intubation to avoid worsening hypertension [8]. General anesthesia during pregnancy carries a higher risk of maternal complications. The Apgar score at birth is higher compared to regional anesthesia [5]. The physiological changes of pregnancy increase the risk of difficult intubation and aspiration, and lead to a decrease in the need for anesthetic agents. Thus, regional anesthesia remains the anesthetic technique of choice for cesarean section. It provides a better maternal-fetal prognosis and facilitates very early mother-child bonding. Spinal anesthesia is the most frequently used technique (80.55%). Other studies conducted in Africa on the management of obstetric emergencies have found similar results [2,3]. Intrathecal bupivacaine is the local anesthetic of choice. The usual recommended dose to achieve a sensory level at T4 is approximately 10 mg. The anatomical and physiological changes of pregnancy lead to a decrease in subarachnoid spaces and therefore in CSF volume. It is therefore necessary to reduce the dose to minimize the hemodynamic impact related to the symptomatic block [9]. The major risk of spinal anesthesia is hypotension caused by the local anesthetic. The consequences of hypotension, if left uncorrected, are a decrease in uteroplacental blood flow with fetal hypoxemia, altered consciousness, and Mendelson's syndrome. Preventive measures for this hypotension include co-fluid administration with a crystalloid solution at the time of spinal anesthesia. This cofilling should not delay the administration of anesthesia [5]. The two vasopressor agents used for this indication are ephedrine and phenylephrine. Ephedrine is not very effective alone at low doses (<10 mg), while higher doses (>15-20 mg) can lead to hypertension and fetal acidosis. Therefore, phenylephrine has been introduced as a first-line vasopressor in cesarean sections. It can be administered either as repeated boluses of 50 to 150 mcg (1 to 1.5 µg/kg) as soon as blood pressure drops, or prophylactically immediately after intrathecal injection in combination with core volume expansion. Very recently, the benefits of norepinephrine have been evaluated due to its β- and α-adrenergic properties. It has comparable efficacy to phenylephrine in maintaining blood pressure but is associated with less bradycardia and decreased cardiac output [10]. In our study, ephedrine, the only available vasopressor, was used to manage peri-anesthetic hypotension during spinal and general anesthesia. Postoperatively, the most frequently used analgesic protocol was the combination of paracetamol and tramadol. Morphine spinal analgesia was used in 25 patients (8.68%). Postoperative pain management is a crucial element in postoperative rehabilitation. Postoperative analgesia after cesarean section should be multimodal, primarily combining epidural or systemic opioids with non-opioid analgesics such as paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), tramadol, or nefopam. Since the vast majority of cesarean sections are performed under regional anesthesia, epidural morphine administration is the cornerstone of multimodal analgesia and the gold standard. This strategy provides effective analgesia for 24 hours regardless of the injection site (intrathecal or epidural) [11]. In our series, the maternal mortality rate was 1.04%. These deaths, related to hemorrhage, occurred in the intensive care unit, reflecting the severity of their clinical presentation.

Although specific procedures are established for cesarean section anesthesia, our study shows that the availability of locally accessible healthcare significantly influences the anesthetic management strategy for emergency cesarean sections.

CONCLUSION

Anesthesia for emergency cesarean section is a high-risk situation. Spinal anesthesia is the preferred anesthetic technique, along with prevention and treatment of hypotension. Obstetric emergencies are frequent and pose a problem in terms of preoperative assessment and management in isolated situations with limited resources.

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