

## Original Research Article

# Anesthetic Management of Peri-Partum Hemorrhagic Shock in Sub-Saharan Africa

Kane MM<sup>1\*</sup>, Ntab SO<sup>2</sup>, Sambou P<sup>1</sup>, D Barboza D<sup>1</sup><sup>1</sup>Anaesthesia & Resuscitation Department, Peace Hospital, Training & Research Unit - Health Sciences, Assane Seck University, Ziguinchor Senegal<sup>2</sup>Gynecology-Obstetrics Service, Peace Hospital, Training & Research Unit - Health Sciences, Assane Seck University, Ziguinchor Senegal**Article History**

Received: 26.09.2025

Accepted: 14.11.2025

Published: 18.11.2025

**Journal homepage:**<https://www.easpublisher.com>**Quick Response Code**

**Abstract: Introduction:** Obstetric bleeding is bleeding during pregnancy that occurs before, during or after childbirth. They can evolve very quickly towards hemorrhagic shock even in patients without known risk factors. The management of these pathological conditions must not give way to improvisation and must involve the obstetrician, the anesthetist-resuscitator, the midwives and the blood bank. **Objective:** Evaluate the management of cases of hemorrhagic shock in the peri-partum. **Patients and Method:** We conducted a retrospective, descriptive, and analytical study over a period of 3 years from January, 2022 to December 31<sup>st</sup>, 2024. We had included all the parturients who presented a hemorrhagic shock pre-operatively as well as those who presented a hemorrhagic shock occurred during surgery. **Result:** During the study period, we compared 62 patients with a frequency of hemorrhagic shock in obstetric emergency of 11.5%. The average age of the patients was 29.9 years with extremes of 19 and 43 years. Six patients presented a scarred uterus (9.67%). The most common cause of hemorrhagic shock was recurrent hematoma (46.8%) followed by postpartum hemorrhages (19.22%). Disorders of consciousness were present at the installation in 19% of patients and 85% had a Shock Index greater than 0.9. General anesthesia was used in 98.4% of patients including those for whom spinal anesthesia was converted. A transfusion was made in 64.5% of the patients with an average of 0.73 units of blood per patient. Vasopressors (Noradrenaline ++) were administered to 82.3% of the patients. We had recorded 4 maternal deaths (6.45%) and 79% of perinatal deaths. **Conclusion:** Hemorrhagic shock constitutes extreme therapeutic emergencies in obstetrics. The anesthetist-resuscitator plays a leading role in managing the complications caused by this pathology. Our study highlights the need to improve the availability of labile blood products in our health structures.

**Keywords:** Hemorrhagic Shock, Obstetrics, Anesthesia, Blood Labile Products, Noradrenaline.

**Copyright © 2025 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

In Senegal, strategies have been implemented to reduce the maternal mortality rate, particularly in the most remote areas of the national territory. However, according to recent national data, significant progress has been made in the context of the Sustainable Development Goals (SDGs). The maternal mortality ratio fell from 392 to 153 per 100 000 live births between 2010 and 2023 (EDS 2023) [1]. Despite the progress made, this rate therefore remains relatively far from the Sustainable Development Goals (SDGs) aimed at reducing maternal mortality to less than 70 deaths per 100 000 live births

[1, 2]. Haemorrhages and their complications are today among the main causes of maternal mortality in the world. According to the World Health Organization, severe bleeding is responsible for about 27% of maternal deaths worldwide, a figure that can reach up to 40% in sub-Saharan Africa where resources are often limited [3, 4]. Obstetric hemorrhage occurs unpredictably and can progress very quickly to hemorrhagic shock, even in patients without known risk factors. Its dramatic and sudden character requires rapid, effective, and coordinated care. This should be multidisciplinary, involving an obstetrician, anaesthetist-resuscitator, interventional radiologist and blood bank. Blood

\*Corresponding Author: Kane MM

Anaesthesia & Resuscitation Department, Peace Hospital, Training & Research Unit - Health Sciences, Assane Seck University, Ziguinchor Senegal

transfusion is a major and decisive tool for restoring blood volume and ensuring appropriate hemodynamic resuscitation.

In this context, the anaesthetist-resuscitator plays a strategic role. It must ensure hemodynamic stabilization, patient preparation and conditioning, transfusion management and the conduct of anaesthesia adapted to the extreme conditions imposed by the state of hemorrhagic shock. The quality of anesthetic management directly influences the maternal and fetal prognosis. It is with this in mind that we conducted this work to evaluate the anesthetic management of obstetric hemorrhagic shock in a hospital in Sub-Saharan Africa.

## PATIENTS AND METHOD

We conducted a retrospective, descriptive, and analytical study over a period of 3 years from January 1<sup>st</sup>, 2022 to December 31<sup>th</sup>, 2024. The study focused on all parturients placed in emergencies in the operating room during the study period. We had included all the parturients who presented a hemorrhagic shock pre-operatively as well as those who presented a hemorrhagic shock occurred during surgery. We studied the frequency of obstetric hemorrhagic shock, the anesthetic protocol, the perioperative adverse events and the main organizational or structural constraints encountered. For the qualitative variables, we had studied: parity, gesture, associated defects, the state of the conjunctival mucous membranes, the causes of obstetric hemorrhage, the anesthetic protocol, the adverse events, the type of transfused labile blood product and drug treatment.

## RESULTS

We collected 62 parturients who presented a hemorrhagic shock during pre or intraoperative surgery, which is a frequency of 11.5%. The average age of the patients was 29.98 years with extremes of 19 and 43 years. Married women (83.87%) were the majority. The multiparous and large multiparous accounted for 45.2% and 25.8% of the workforce, respectively. The most common etiology of hemorrhagic shock was retroplacental hematoma (46.8%). Postpartum haemorrhages due to uterine atony, soft-tissue injury or placental retention had caused a state of shock for 19.22% of the group. Disorders of consciousness were present in 19.4% of patients. All patients had pallor of the conjunctival mucous membranes. They presented a coldness of the extremities in 53.22% of cases. At admission, fourteen patients, or 22.6%, had a mean arterial pressure (MAP) less than 60 mmHg. The average heart rate was 124.19 beats/min with extremes of 60 and 160 beats per minute. The average Shock Index (SI) was  $1.33 \pm 0.51$  and 85.5% of parturients had a SI of 0.9 at admission to the operating room. The majority of patients (88.7%) underwent a cell blood count (CBC) at admission and 100% had a Rhesus factor. On the other hand, none was able to benefit from a coagulation assessment (PTT, INR, TCK, fibrinogen level). Severe

anemia (Hb < 7 g/dl) was present in 63.6% of patients. The average hemoglobin level is 6.51 g/dl with extremes of 2.5 g/dl and 13.2 g/d. The majority of patients (71%) had a hematocrit less than 21%. Severe thrombopenia (<100 G/L) was present in 21% of patients. General anesthesia with rapid sequence orotracheal intubation was the most used technique (95.2%). Spinal anesthesia was performed in 3 patients (4.8%). These were patients for whom the hemorrhagic shock occurred during surgery. The hypnotic used for induction was ketamine in 98.4% of patients while succinylcholine was the curare used in 98.4%. Propofol was used only exceptionally in combination with ketamine in one patient (1.6%) who had co-induction. Fentanyl was also used in 98.4% of patients. In the maintenance phase, ketamine was the main agent (67.1%) while isoflurane was the only halogen used (32.9%). In our series, the estimated blood loss was greater than 2000 ml in 16.2% of patients. They were between 1500 and 2000 ml for 22.5% of our workforce. For the rest, bleeding was between 500 and 1500 ml. Tachycardia was the most common intraoperative incident in 98.4%. Bradycardia occurred in 6.45% and cardiac arrest in 3.22%. Among the patients who presented surgical incidents, multiparous and large multiparous accounted for 52.1% and 27.1% respectively with a p-value of 0.004. There was therefore a significant statistical link between parity and the operational incidents. Similarly, these incidents were proportionally more frequent in patients with massive blood loss (p-value = 0.039). Sympathomimetics had been used in 82.25% of patients. Ephedrine was most frequently used (78.4%) followed by noradrenaline (13.7%) and finally adrenaline (7.9%). Vascular filling relied on a combination of crystalloids and colloids in 71% of patients. A small proportion (4.3%) received exclusively colloids. The average quantity of crystalloids used was 967 ml. For colloids, the average quantity was less important with 585 ml. We had transfused 40 patients, or 64.5%. We had used whole blood in 37 patients (59.6%) and associated with fresh frozen plasma (FFP) in 3 (4.8%). The average number of total administered blood bags was  $0.73 \pm 0.63$  bag. The majority of transfused patients received only one unit of blood, a proportion of 54.83% of cases. For the vast majority of patients (93.5%), the transfusion requirements were not covered. We had used tranexamic acid in 87.1% of our patients. An hysterectomy had been performed in 20 patients (32.25%) and arterial ligation in 4.8% of the patients. The average duration of the interventions is 92.42 minutes with extremes of 30 and 230 min. Among the 43 fetal extractions, we had recorded 79% of stillbirths. Two maternal deaths (3.22%) had been recorded intraoperatively. Post-operative admissions in intensive care accounted for 51.7% of cases. Among the patients admitted to intensive care, we had recorded 2 deaths (3.22%) for a total of 6.44% (4 deaths).

## DISCUSSION

Our study has several limitations. Its retrospective nature and the uneven quality of the files expose to information bias. Furthermore, although the center has a blood bank, its supply remains limited due to the low rate of voluntary donations. Furthermore, the immediate non-availability of certain essential emergency biological assessments may have delayed optimal management of severe obstetric hemorrhages. These limits must be taken into account in the interpretation of the results.

In our series, the frequency of cases of obstetric hemorrhagic shock was 11.5%. This frequency is comparable to the 10% found by Matsanga [5], but remains significantly higher than the 5.9% found by Mobio [6], in Ivory Coast. Our high prevalence could be explained by certain difficulties encountered in our work context. These include sometimes a delay in seeking medical care, difficulties in quickly referring patients causing the appearance of many complications before admission to hospital. Similarly, a lack of human and material resources hinders the quality of the monitoring that is essential to detect early warning signs and stop the evolution towards shock. Retroplacental haematoma was the most common shock etiology (47%). Postpartum hemorrhages were found in 19.22% of our patients and uterine ruptures in 13%. In Niger and Gabon, Nayama [7], and Matsanga [5], had reported the responsibility of the HRP in hemorrhagic shock in 53.3% and 22% respectively. The retroplacental hematoma is a premature detachment of the normally inserted placenta. This is one of the great medical-obstetric emergencies par excellence. It is an unpredictable pathology that can reach primiparous or multiparous in the absence of any previous history or pathological terrain [8]. Uterine rupture was responsible for 13% of shock states in our series. This proportion was 6% in the Matsanga [5], series. It is a disease whose incidence remains relatively high in resource-limited countries due to undermedication. It is more common in patients with an uterus weakened by multiparity, most often in a context of fetal-pelvic disproportion or dystoic presentations left to them-same [9]. Its prevention involves appropriate monitoring of patients at risk in order to proceed with fetal extraction at the slightest warning sign. Uterine atonia accounted for 11.3% of the causes of obstetric hemorrhage. The main risk factors for atony such as uterine distention, multiple pregnancies or prolonged labor are well documented in the literature [10]. In our series, the high proportion of multiparous (42.5%) could have contributed to this risk.

Clinical signs of hypoperfusion were common. The patients presented a pallor of the conjunctival mucous membranes. The coldness of the extremities was noted in 53.22% of them and disorders of consciousness in 19.4%. These results are consistent with those of Mobio [6], and Matsanga [5], which found paleness of

the mucous membranes in 94.5% and 81.6% of patients, respectively. The coldness of the extremities was present in 86% of patients in the Matsanga [5], series. These signs of hypoperfusion are the consequence of blood loss. The body's counter-regulation mechanisms such as peripheral reflex vasoconstriction and tachycardia are then triggered by the body. The evaluation of the Shock Index ( $SI = HB/SBP$ ) showed that 85.5% of patients had a  $SI \geq 0.9$  and 82.3% had a  $SI \geq 1$  indicating a worrying circulatory imbalance. The Shock index, the ratio between heart rate and systolic blood pressure is recognized as a reliable marker of the severity of obstetric shock. Studies have shown that Shock Index  $\geq 0.9$  or 1 are associated with severe maternal morbidity and an increased need for massive transfusion [11, 12]. In our series, its value in assessing hemodynamic decompensation has proven valuable. These data are consistent with the pathophysiological mechanisms described by Ramarolahy [13], which shows that hemorrhagic shock causes acute hypovolemia responsible for tissue hypoperfusion. This is clinically manifested by paleness, mottling, headaches, coldness of the extremities, visual blurring or even disorders of consciousness. This semiology, although simple, retains all its relevance in the context of low-resource countries. The average hemoglobin level observed was 6.51 g/dl with extremes of 2.5 and 13.2 g/dl reflecting severe anemia in the majority of patients. These results testify to the extent of blood loss at the time of admission. General anesthesia with rapid orotracheal intubation was performed in 95.2% of the patients. This rate is similar to the 94.2% reported by Boubacar in Mali. It is the reference technique in patients in a state of shock. It allows to avoid the sympathetic block and vasoplegia caused by peri-medullary anesthesia. The main hypnotic used for induction was ketamine in 98.4% of patients. It is an anesthetic agent with cardiovascular effects that are essentially due to stimulation of the sympathetic centers and an increase in circulating catecholamines. The central sympathomimetic effect is potentiated by inhibition of catecholamine reuptake. The administration of ketamine causes an increase in heart rate, blood pressure and cardiac output but the central action is accompanied by a reduction in arterial baroreflex [15]. Succinylcholine was used in 98.4%. It is a depolarizing curare facilitating rapid airway control. In our series, 51 patients (82.3%) received pressors intraoperatively. Ephedrine was used in 78.5% of patients while noradrenaline and adrenaline were administered in 13.7% and 7.9%, respectively. These sympathomimetic agents play a key role in the management of a state of shock. They act on alpha and beta adrenergic receptors and allow an increase in systemic vascular resistance, heart rate, and myocardial contraction force. These effects help to restore the average arterial pressure and tissue perfusion pressure. The initial filling was mainly based on crystalloids with a mean volume of 967 ml, administered alone in 25.8% of cases and in association with colloids (gelatins) in 71% of cases. However, the exclusive use of colloids remained marginal (3.2%).

These data corroborate international recommendations, which advocate crystalloids as a first-line treatment for hemorrhagic shock. The use of colloids is only justified in situations where crystalloids prove to be ineffective and in the absence of counter-indications [16]. Blood transfusion was performed in 64.5% of our patients with a clear predominance of the use of whole blood (92.5% of transfused cases) while only 3 patients (7.5%) received fresh frozen plasma (FFP) in addition. The average number of whole blood bags administered was  $0.73 \pm 0.63$  with extremes of 0 and 3. For comparison, in the Bennani Moroccan series [17], all patients received a transfusion with an average of 6 globulin units and 78.8% received FFP as a supplement. This difference is explained by a difficulty in accessing labile blood products in our countries with limited resources. Indeed, blood donations vary considerably between countries. This rate is an indicator of the general availability of blood in a country. The median blood donation rate in high-income countries is 31.5 per 1 000 inhabitants. In low-income countries, it is only 5 per 1000 inhabitants [18]. The retention of voluntary blood donors is a major issue in our countries for the continuous renewal of blood stocks in our healthcare facilities. Tranexamic acid was used in 54 patients, or 87.1% of the population in our series. It is a drug used for its anti-fibrinolytic properties. The data in favor of its effectiveness are increasingly numerous [19, 20]. We recorded 4 deaths, an overall rate of 6.4%. Two deaths occurred during intraoperative surgery and two others in intensive care. This rate is lower than those of the Boubacar [14], Ramarolahy [13], or Tshabu-Aguemon [21], series which had respectively 13.9%, 9.3% and 15.4% deaths. The maternal deaths in our series occurred in patients with deep shock and a Shock Index (SI) > 1.5. None of the deceased patients had received a sufficient number of bags to compensate for the estimated blood loss. We had recorded 79% neonatal mortality. This is a rate comparable to those found by Boubacar [14], (85%) and Nayama [7], (72%). These figures reflect the need to improve the quality of healthcare provision by facilitating access to better quality care.

## CONCLUSION

Anesthesia in obstetrics in a context of hemorrhagic shock is a major challenge for the resuscitator and the obstetrician. The prevention of these pathological situations involves improving the monitoring of pregnant women and parturients at all stages of their care. The management of the numerous complications of hemorrhagic shock requires a certain number of essential resources such as adapted anaesthetic products but also blood products in sufficient quantity.

## BIBLIOGRAPHY

1. Agence Nationale de la Statistique et de la Démographie (ANSD). 5<sup>e</sup> Recensement Général de la Population et de l'Habitat (RGPH-5), 2023 : Rapport provisoire sur la mortalité. Dakar (Sénégal) : ANSD ; juillet 2024 [cité le 14 août 2025]. Disponible sur : [https://www.ansd.sn/sites/default/files/2024-07/RGPH-5\\_Rapport%20global-Prov-juillet2024.pdf](https://www.ansd.sn/sites/default/files/2024-07/RGPH-5_Rapport%20global-Prov-juillet2024.pdf)
2. Countdown to 2030 for the Health of Women, Children and Adolescents. Indicateurs de santé reproductive, maternelle, néonatale et infantile – Rapport 2023, Sénégal. Dakar (Sénégal) : Countdown to 2030 ; 2023 [cité le 14 août 2025]. Disponible sur : <https://www.countdown2030.org/wp-content/uploads/2024/02/Rapport-Senegal.pdf>
3. Organisation Mondiale de la Santé. Trends in Maternal Mortality: 2000 to 2020. OMS, 2023.
4. Say L. "Global causes of maternal death: a WHO systematic analysis." *Lancet Global Health*, 2014.
5. Matsanga A, Nze Obiang PC. Aspects cliniques et évolutifs du choc hémorragique obstétrical en réanimation du Centre Hospitalier Universitaire d'Owendo, Gabon. *Rev. Anesth. -Réanim. Med. Urg. Toxicol.* 2022 Juil-Déc; 14(2):12-16.
6. Mobio M, Bekoin A, Abhe C. Prise en charge anesthésique de la patiente en état de choc hémorragique au cours des urgences gynéco-obstétricales au CHU de Cocody. *RAMUR* 2018; 23(3) : 34
7. Nayama M. Les hystérectomies d'hémostase en pays sous-équipé : un geste vital. Étude prospective dans une maternité de référence au Niger. *Gynécologie Obstétrique & Fertilité*, 2006 ; 34 : 900-905
8. Zwart JJ, Richters JM, Ory F, de Vries JIP, Bloemenkamp KWM, van Roosmalen J. Uterine rupture in The Netherlands: a nationwide population-based cohort study. *BJOG Int J Obstet Gynaecol.* 2009 Juill;116(8):1069-78. doi: 10.1111/j.1471-0528.2009.02136.x. discussion 1078-1080.
9. Cissé CT. Rupture utérine au Sénégal . *Epidémiologie et qualité de la prise en charge. Médecine Tropicale* 2002 ; 62 : 619-622].
10. Ogoudjobi OM Facteurs de risque d'hémorragie du post partum immédiat dans un hôpital du district nord de Bénin *Journal de la société de biologie clinique du Bénin*, 2017 ; 78-83.
11. Nathan HL. Shock index: an effective predictor of outcome in postpartum haemorrhage. *BJOG.* 2015; 122(2):268-75.
12. Singh S, McGlennan A, England A, Simons R. A validation study of the Shock index in obstetric hemorrhage. *BJOG.* 2014 ; 121(5) :539-46.
13. Ramarolahy ARN, et al : Choc hémorragique au CHU de Gynécologie et Obstétrique de

- Befelatanana. Rev. Anesth.-Réanim. Med. Urg. Toxicol. 2021 ; 13(2): 16-20.
14. Boubacar M. Hémorragies obstétricales graves : Prise en charge anesthésique au CHU du Point G. Bibliosante ; 2014
15. Riou B. Effets cardiovasculaires de la kétamine. P 109-120 Dans : Mion G (ed). Kétamine. Paris : Arnette, 2003
16. Duranteau J, Asehnoune K. Recommandations sur la réanimation du choc hémorragique. Groupe de travail SFAR, SRLF, SFMU, GEHT. Ann Fr Anesth Réanim, 2015;34(2):99-113.
17. Bennani H. Le choc hémorragique en obstétrique. Thèse de doctorat. Faculté de Médecine et de Pharmacie, Casablanca; 2002. Thèse n°1804.
18. WHO. Blood safety and availability disponible sur <https://www.who.int/fr/news-room/fact-sheets/detail/blood-safety-and-availability> Consulté le 06 octobre 2025
19. Annane D, Siami S, Jaber S. Effects of fluid resuscitation with colloids vs crystalloids on mortality in critically ill patients. JAMA. 2013; 310(17):1809-17.
20. Franchini M, Lippi G, Franchi M. The use of recombinant activated factor VII in obstetric and gynaecological haemorrhage. Br J Obstet Gynaecol 2007; 114: 8-15.
21. Tshabu-Aguèmon C, Denakpo J, Adisso S, Mampassi E, De Souza J. Mortalité maternelle et périnatale liée aux références obstétricales au CNHU-HKM de Cotonou au Bénin (CUGO). Rev Afr Anesth Med Urg 2012,17(1) : 37-43.

---

**Cite this article:** Kane MM, Ntab SO, Sambou P, D Barboza D (2025). Anesthetic Management of Peri-Partum Hemorrhagic Shock in Sub-Saharan Africa. *EAS J Anesthesiol Crit Care*, 7(6), 167-171.

---