

Determinants of Maternal Morbidity and Mortality Related to Anesthesia in Course of Cesarean Section in a Low-Income Country: Experience from the Centre Hospitalier Mère-Enfant Monkole

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Abstract

Objective: The role of anesthesia in maternal mortality is unknown in the Democratic Republic of Congo (DRC). This study was conducted with the objective of analyzing the determinants of morbidity and maternal mortality linked to anesthesia in course of cesarean section. **Methods:** This is a prospective, analytical and mono-centric study carried out on women who underwent cesarean section at the Centre Hospitalier Mère-Enfant Monkole from January 1st, 2011 to December 31st, 2018. The variables analyzed were socio-demographic, clinical, biological and anesthetic as well as the maternal issues. Data analysis was performed with SPSS 21.0 software. The determinants of mortality were sought by logistic regression with $p < 0.05$. **Results:**

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During this period, 1954 cesarean sections were performed. The mean age of the women was 31 years (range 14 to 47), 1549 women (79.3%) had completed prenatal consultation in Monkole and 405 (20.7%) elsewhere. The emergency was extreme in 192 cases (9.82%), absolute in 445 (22.77%) and relative in 1317 (67.4%). Locoregional anesthesia (LRA) was performed in 1811 cases (92.68%). The main complications were marked by arterial hypotension (22.9%) due to spinal anesthesia, and mortality was 0.56%. In multivariate analysis, only extreme emergency (aOR 7.62 95% CI: 2.80 - 71.23 $p = 0.007$), coma on admission (aOR 10.44 95% CI: 1.81 - 60.13 $p = 0.009$), general anesthesia (aOR 15.41 95% CI: 2.11 - 40.21 $p = 0.007$) and intraoperative transfusion due to anemia/hemorrhage (aOR 8.63 95% CI: 1.07 - 69.55 $p = 0.043$) persisted as determinants of maternal death. **Conclusion:** Maternal mortality (0.56%) in this series was relatively low for a low-income country and no death was directly related to anesthesia. General anesthesia, extreme urgency, intraoperative transfusion due to anemia/bleeding, and coma on admission were the major determinants of mortality.

Keywords

Determinants, Maternal Morbidity and Mortality, Anesthesia, Cesarean, Monkole

1. Introduction

The World Health Organization (WHO) [1] defines maternal mortality as the death of a woman occurring during pregnancy or within 42 days of its termination regardless of its duration or location, for any cause determined or aggravated by the pregnancy or the care it motivated. There is no standardized definition of maternal morbidity. It has been proposed to define severe morbidity concerning the main obstetric emergencies as the set of complications requiring urgent medical intervention to avoid maternal death [2]. We defined maternal anesthetic morbidity and mortality when the cause of which is directly related to the anesthetic act. According to the WHO report [3], 300,000 maternal deaths are recorded each year around the world, 99% of which come from low and middle income countries. Morbidity linked to complications in pregnancy, childbirth and postpartum affects approximately 9% to 15% of parturients and remains difficult to measure because it depends on the quality of available care and the information system. In 2019, the WHO [4] estimated that around 830 women die worldwide every day from complications related to pregnancy or childbirth. Anesthesia for cesarean section is characterized by the need to ensure safety for the mother-child pair and the risk of maternal morbidity and mortality is not zero given the physiological changes in pregnancy, the indication for cesarean section and maternal state [5]. The maternal anesthesia-related mortality rate is low in high-income countries [6] [7] [8], 14.8 per 100,000 caesarean sections in South Africa, a contribution of 2.4% to overall mortality [9], in Nigeria

out of 5.6 deaths per 1000 cesarean sections, 6 were related to anesthesia [10]. Maternal morbidity for planned cesarean section in Japan between 2010 and 2013 was 2% under general anesthesia (GA) and 0.7% under locoregional anesthesia (LRA) [11]. This morbidity increased from 0.74% to 1.29%, between 1998 and 1999 to 2008 and 2009 in the USA [7]. It doubled in LRA and decreased in GA in Germany [8]. In low- and middle-income countries, the risk of dying for a woman who underwent cesarean section is 1.2/1000. Anesthesia accounts for 2.8% [2.4 - 3.4] of all maternal deaths, 3.5% of all direct maternal deaths, and 13.8% of deaths after cesarean section [12]. In the Democratic Republic of Congo (DRC), with a maternal mortality rate of 690 per 100,000 live births in 2015 [13], there are no data on maternal morbidity and mortality related to anesthesia. This study was conducted with the objective of investigating the determinants of maternal mortality and morbidity related to anesthesia during cesarean section in a low-income setting.

2. Patients and Methods

Type of study: It is a prospective, analytical and one-center study. The population consisted of all women who underwent cesarean section at the Mère-Enfant MONKOLE Hospital (MEMH) from 1/1/2011 to 31/12/2018. The MEMH is a level II hospital, acting as the general referral hospital of the urban-rural health zone of Mont Ngafula I.

Patients selection: All women anesthetized and caeserized at the MEMH during the study period were included. Those operated secondarily after vaginal delivery was not included. An electronic file containing the data of women who underwent cesarean section has been drawn up and the women recruited exhaustively and consecutively. The vital outcome was assessed until the first post-natal appointment, six weeks after cesarean section. The variables collected were: Sociodemographic variables: age (divided into three: <18 years old, between 18 and 35 years old and over 35 years old), the body mass index (BMI) in kg/m². Obstetric variables: the place for prenatal consultation (MEMH or referred); parity grouped into 4: primiparous (one childbirth), pauciparous (2 to 3 childbirths) multiparous (4 to 6 childbirths) and large multiparous (more than six childbirths); fundal height and indications for cesarean section grouped into three according to the degree of emergency: extreme emergency (immediate action: <5 to 15 minutes), absolute emergency (action <30 minutes) and relative emergency (action >30 minutes). Clinical variables: Glasgow coma score, anesthetic risk according to the American Society of Anesthesiologists (ASA) classification before the 2020 revision and Cormack and Lehane's grade. Biological variables: hemoglobin level grouped into three: severe anemia (<7 g/dl), moderate (7 to 10.9 g/dl) and normal (11 g/dl and more) and platelet count. Intraoperative variables: anesthetic technique, intraoperative complications (an anesthetic complication is one that can only be linked to anesthetic products or technique), intraoperative transfusion, operative procedures performed (cesarean sec-

tion alone and or another act), qualification of the interveners (senior or junior), degree of emergency and time of intervention (day: 8:00 a.m. to 5:00 p.m. or night: 5:00 p.m. to 8:00 a.m. and public holidays). Postoperative complications, maternal outcome, and determinants of morbidity and mortality were investigated. The definition of maternal death was that of the WHO [1] but only in the context of cesarean section.

Statistical analysis: Data were entered into an Excel file, coded, analyzed with SPSS 21.0 and presented as frequency and mean. The comparison of the variables was made with the Student's t test or Chi-square or Fischer's exact test. Determinants of mortality were sought using the logistic regression test. The odds ratios and their confidence intervals were used to establish the degree of association. The p-value was set to <0.05.

Ethical considerations: The approval of the CEFA/MONKOLE ethics committee has been obtained (letter N/ref: 004 CEFA-MONKOLE/CEL/2020). The principles of anonymity and confidentiality of the Helsinki Convention have been respected during all data collection and processing processes and informed consent obtained.

3. Results

During this period, 1954 cesarean sections were performed out of 6720 registered deliveries, a rate of 29%.

3.1. Population Characteristics

The population's characteristics are presented in **Table 1**. The average age of women was 30.01 years (14 - 47 years), 405 (20.7%) were referred from the other facilities. The emergency was extreme in 192 cases (9.82%), absolute in 445 cases (22.77%) and relative in 1317 cases (67.4%). The ASA class was III in 66 cases (3%) and IV in 3 cases (0.2%). The Glasgow on admission was 15 in 1924 cases (98.5%). The Hb level was <7 g/dl in 30 cases (1.6%), between 7 - 10.9 g/dl in 909 cases (47.7%). The anesthesia performed was locoregional in 1811 cases (92.68%) and general in 143 cases (7.31%). The transfusion was done in 123 cases (6.3%).

3.2. Maternal Morbidity

The intraoperative and postoperative complications are presented in **Table 2**.

The most common intraoperative anesthetic complications were: arterial hypotension: 447 cases or 22.9%, anxiety: 102 cases or 5.2%, failure or insufficient block: 50 cases or 2.5%. Major postoperative complications were found in 69 cases (3.5%), of which the most frequent: severe anemia 49 cases (2.3%), maternal death in 11 cases (0.56%), pre-eclampsia and eclampsia (0.3% respectively).

3.3. Factors Associated with Maternal Mortality

Factors associated with maternal mortality are presented in **Table 3**.

Table 1. Characteristics of the population.

Variables		Frequency	%
Age	<18 years	452	23.1
	18 - 35 years	1476	75.5
	>35 years	26	1.3
BMI (kg/m ²)	<18.5	40	2.0
	18.5 - 24.99	1055	54.0
	25 - 29.99	601	30.8
	≥30	258	13.2
PNC location	Monkole	1549	79.3
	Referred	405	20.7
Emergency degree	Extreme	192	9.8
	Absolute	445	22.8
	Relative	317	67.4
ASA Class	I	317	67.4
	II	535	27.4
	III	66	3.0
	IV	3	0.2
Cormack grade	I	122	6.0
	II	21	1.0
Glasgow at the admission	15	1924	98.5
	9 - 14	27	1.4
	<9	3	0.2
Hb level	≤7 g/dl	30	1.6
	7.1 - 10.9 g/dl	909	47.7
	≥11 g/dl	968	50.8
Platelet count	<150,000	308	17.7
	≥150,000	1467	82.3
Intraoperative transfusion	No	1831	93.7
	Yes	123	6.3
Type of anaesthesia	LRA	1811	92.7
	GA	143	7.3
Operative procedure	Caesarean section	1917	98.1
	Hysterorrhaphy	26	1.3
	Caesarean/HST	7	0.3
	HST	4	0.2
Operator	Senior	432	22.1
	Junior	1522	79.9
Anaesthesiologist	Senior	1350	69.1
	Junior	604	30.9
Time to intervention	Night	858	43.9
	Day	1096	56.1

Legend. BMI: body mass index, PNC: prenatal consultation, Hb: Hemoglobin, GA: general anaesthesia, LRA: locoregional anaesthesia, HST/hysterectomy.

Table 2. Intra and postoperative complications.

Variables	Frequency	%
Intraoperative complications		
None	1324	67.8
Arterial hypotension	447	22.9
Anxiety	102	5.2
Failure or insufficient block	50	2.5
Pruritus	25	1.3
Vomiting/epigastralgia	17	0.9
Thrill	5	0.3
High spinal anaesthesia	3	0.2
Bradycardia	2	0.1
Allergic reaction	2	0.1
High blood pressure	1	0.1
Bronchospasm	1	0.1
Cardiopulmonary arrest recovered	1	0.1
Postoperative complications		
None	1834	93.8
Minors	40	2.0
Wound infections	22	1.1
Urine retention	5	0.3
Headache postspinal anaesthesia	3	0.2
Endometritis	3	0.2
Urinary tract infection	2	0.1
Moderate anemia	2	0.1
Overdosis morphinic	1	0.1
Majors	69	3.5
Severe anemia	49	2.3
Maternal death	11	0.6
Preeclampsia	6	0.3
Eclampsia	6	0.3
Pulmonary embolism	2	0.1
Ureters ligation	1	0.1
Bladder-vaginal fistula	1	0.1
Bladder injury	1	0.1
Post-anox encephalopathy	1	0.1
Postoperative peritonitis	1	0.1

Table 3. Factors associated with maternal mortality.

Variables	n	Alive n (%)	Death n (%)	P
Location of prenatal consultation				<0.001
Monkole	1548	1546 (99.87%)	2 (0.13)	
Referred	406	397 (97.78%)	9 (2.22)	
Degree of emergency				<0.001
Extreme emergency	134	129 (96.26)	5 (3.74)	
Absolute emergency	486	483 (99.38)	3 (0.62)	
Relative emergency	1334	1331 (99.77)	3 (0.23)	
Consciousness				<0.001
Lucid	1924	1918 (99.68)	6 (0.32)	
Impaired	30	25 (83.33)	5 (16.66)	
ASA class				<0.001
I	1059	1059 (100)	0 (0)	
II	625	622 (99.52)	3 (0.48)	
III	227	227 (100)	0 (0)	
IV	43	35 (81.39)	8 (18.6)	
Hemoglobin level				<0.001
<7 g/dl	30	27 (90)	3 (10)	
8 à 10.9 g/dl	909	902 (99.23)	7 (0.77)	
≥11 g/dl	968	967 (99.86)	1 (0.14)	
Platelets count				<0.001
<150,000/mm ³	308	302 (98.05)	6 (1.95)	
≥150,000/mm ³	1467	1464 (99.79)	3(0.21)	
Anaesthetic technique				<0.001
General anaesthesia	143	134 (93.71)	9 (6.29)	
Locoregional anaesthesia	1811	1809 (99.88)	2 (0.12)	
Blood transfusion				<0.001
Transfusion	123	116 (94.3)	7 (5.7)	
No transfusion	1831	1827 (99.78)	4 (0.22)	
Acte opératoire				<0.001
Cesarean section	1941	1933 (99.58)	8 (0.42)	
Cesarean section and or other procedures	13	10 (76.92)	3 (20.08)	

There were more deaths among the women referred 2.21% vs 0.12% among those who underwent prenatal consultation at Monkole ($p = 0.001$). In extreme emergencies, there were 2.6% deaths compared to 0.67% in absolute emergencies and 0.22% in relative emergencies ($p = 0.001$). The altered state of consciousness on admission was accompanied by a higher mortality than the state of lucidity 16.6% vs 0.31% ($p = 0.001$). In ASA I and III classes there were no deaths, in ASA II class there was 0.48% and in ASA IV class there were 18.6% ($p = 0.001$). Severe anemia was linked to a higher mortality than the absence of anemia: 10% vs 0.1% ($p = 0.001$), as was thrombocytopenia 1.6% vs 0.2% ($p = 0.001$). General anesthesia was accompanied by a high mortality: 6.29% compared with regional anesthesia: 0.11% death ($p < 0.001$).

3.4. Influence of BMI on the Quality of the Block and the Height of the Uterus on the Arterial Hypotension

The influence of BMI on block quality and fundal height on arterial hypotension is reported in **Table 4**.

At a uterine height greater than 34 cm, arterial hypotension was found in 112 cases (26.92%), and in 213 cases (19.85%) when it was between 30 and 34 cm and only in 20 cases (1.18%) when it was less than 30 cm ($p = 0.001$). BMI did not influence the quality of the block.

3.5. Determinants of Maternal Mortality (Table 5)

Multivariate analysis showed that extreme emergency (aOR 7.62 95% CI: 2.80 - 71.23 $p = 0.007$), coma on admission (aOR 10.44 95% CI: 1.81 - 60.13 $p = 0.009$), general anesthesia (aOR 15.41 95% CI: 2.11 - 40.21 $p = 0.007$) and intraoperative transfusion (aOR 8.63 95% CI: 1.07 - 69.55 $p = 0.043$) were accompanied by high mortality and were the determining factors of maternal death.

Table 4. Influence of BMI on block quality and fundal height on arterial hypotension.

BMI	Quality of spinal block			$p = 0.575$
	Good block (%)	Insufficient block (%)	Spinal anaesthesia failure (%)	
Thinness	36 (97.29)	1 (2.71)	0 (0)	37 (100)
Normal	1014 (97.4)	11 (0.1)	16 (1.5)	1041 (100)
Overweight	604 (98.21)	6 (0.97)	5 (0.81)	615 (100)
Obesity	253 (96.93)	5 (1.91)	3 (1.14)	261 (100)
Arterial hypotension				$p = 0.001$
Uterine height	No (%)	Yes (%)		
<30 cm	121 (85.81)	20 (14.18)	141	(100)
30 - 34 cm	860 (80.14)	213 (19.85)	1073	(100)
>34 cm	304 (73.07)	112 (26.92)	416	(100)

Table 5. Determinants of maternal mortality.

Variables	Univariate analysis		Multivariate analysis	
	P	OR (95% CI)	p	aOR (95% CI)
Indication				
Relative emergency		1		1
Absolute emergency	0.013	6.24 (1.47 - 26.46)	0.113	0.13 (0.01 - 1.63)
Extreme emergency	<0.001	17.20 (4.06 - 72.77)	0.007	7.62 (2.80 - 71.23)
PNC				
Monkole		1		1
Referred	<0.001	17.52 (3.77 - 81.43)	0.099	4.79 (0.75 - 30.76)
Consciousness				
Lucid		1		1
Coma	<0.001	63.93 (18.31 - 223.30)	0.009	10.44 (1.81 - 60.13)
ASA class				
Others		1		1
ASA IV	<0.001	47.39 (12.04 - 186.48)	0.225	2.22 (0.61 - 8.00)
Anesthetic techniques				
LRA		1		1
GA	<0.001	60.75 (12.99 - 283.99)	0.007	15.41 (2.11 - 40.21)
Transfusion (anemia)				
No		1		1
Yes	<0.001	27.56 (7.95 - 95.51)	0.043	8.63 (1.07 - 69.55)
Chirurgical procedure				
Cesarean section		1		1
Cesarean + other act	<0.001	72.48 (16.75 - 313.76)	0.124	6.26 (0.60 - 9.20)

Table 6. Distribution of causes of patient death.

Causes of death	Number (n = 11)	Percent
Hemorrhagic shock	5	45.5
Hemorrhagic stroke	2	18.2
Eclampsia	1	9.1
Pulmonary embolism	1	9.1
Septic shock	1	9.1
Acute respiratory distress syndrome	1	9.1

3.6. Distribution of Causes of Patient Death

Among the causes of death found, hemorrhagic shock and hemorrhagic stroke were the most represented (**Table 6**).

4. Discussion

Our study, although mono-centric, includes a population fairly representative of the local context with regard to age groups with a majority between 18 and 35 years (75.53%), few women were obese (13.2%), non-negligible rate of women referred from primary structures (20.7%), the relatively high emergency cesarean section rate (32.6%), on the other hand the qualification of the interveners differs from what happens in the majority of hospitals in the low income countries [14]. The cesarean rate in our series was 29%. A study led by WHO [14] reports that between 1990 and 2014, the global average rate of cesarean section fell from 12.4% to 18.6% with rates varying according to the regions, between 6 and 27.2%, and increasing at an average rate of 4.4% per year. This increase was slight but real in sub-Saharan Africa during the same period. This is the case in our institution, where the rate fell from 15% in 2005 to 29% in 2018 when it became a general referral hospital. The overall mortality in our series was 0.56% and with no cases attributable to anesthesia. The determinants of maternal mortality in multivariate analysis were: extreme emergency, coma on admission, general anesthesia and intraoperative transfusion. In a multicenter study that included 2,933,457 cesarean sections in 59 countries, Sobhy [15] found 8 maternal deaths in 1000 women (0.8%) in the low- and middle-income country. Our mortality is lower, perhaps because of the qualifications of the interveners and the internal organization of the hospital allowing rapid treatment of emergencies. Maternal mortality in South Africa was 18.9 deaths per 10,000 caesarean sections and 14.8 deaths were related to anesthesia which contributed to 2.4% of the maternal mortality rate [9]. Our overall rate exceeds that of South Africa even though no death was attributed to anesthesia in our series. This shows the disparities between countries. In our series, the average age of women is 31.01 years old, close to Trabelsi [16] in Tunisia (30.2 years) and the majority (75.53%) are between 18 and 35 years old, results different from Beye [17] in Mali (15 to 25 years old), with a different grouping from ours. Although maternal age beyond 35 increases the obstetric risk, our results do not show excess mortality in this age group. A fairly recent review of the literature had shown that the causes of maternal death in adolescents and elderly women are the same in low-income countries [18], which corroborates our results.

We recorded 81.83% of maternal deaths among the referred women (PNC outside the MEMH). In fact, a significant number of them had either not followed the PNC at all or had followed it poorly. This explains the very high mortality described by other authors [19] [20] [21]. In addition, these referred women arrived at the hospital either on foot, on a motorbike or car, but never with an ambulance. Although performing LRA in obesity conditions is difficult [22], we had neither failure nor insufficiency of obesity-related block, probably because we had no cases of morbid obesity [23]. We did not record excess mortality in women who had multiple cesarean sections, but relatively more intraoperative bleeding as Hyginus [24] found. Maternal mortality is very high dur-

ing an extremely emergency cesarean section (45.5% of deaths), which corroborates the data in the literature [25]. We observed that a uterine height greater than 34cm was accompanied by arterial hypotension (32.5% versus 23.7%) suggesting aorto-caval compression by the uterus as described in the literature [26]. Our results show that the mortality in ASA IV patients is very high (72% of deaths) confirming the relationship between the ASA class and mortality [27]. Although the pregnant woman is considered difficult to intubate [26], no cases of difficult intubation or inhalation in the 143 women who underwent general anesthesia were recorded. Trabelsi [16] reported 0.21% difficult intubation in his series with a general anesthesia rate higher than ours. However, some authors have underlined that this difficult intubation 5 to 8 times than the non-pregnant woman remains rare as in their series [28] [29]. Although the platelet count was not taken in some women who received LRA, no cases of peri-medullary hematoma were recorded as Bloom found (0%) in 14,797 patients. [27] Nine out of 11 deaths, 81.8% occurred during GA which has emerged as a major determinant of maternal death. However, the pathologies presented by women operated on under GA were not only indications of general anesthesia but also factors of maternal mortality (eclampsia, uterine rupture, hemorrhagic placenta previa). Bloom in 2005, for example, found that 38% of general anesthesia was performed for emergencies [27]. All of the participants were doctors, unlike the other African series, and their qualification did not influence mortality [30] [31]. Mortality is higher in emergency surgery: 90.9%, vs regulated surgery: 9.1% ($p < 0.001$). This deleterious role of emergency has been found by other authors [32]. Arterial hypotension without maternal-fetal consequences because treated quickly was the most frequent complication due to the justified use of spinal anesthesia [33]. The rate of intraoperative maternal incidents in our series is 32.2%, higher than those reported by other authors due to the different understanding of intraoperative incidents [34] [35]. Typical anesthetic complications accounted for 3% as Bloom [27] had found: one in 29 deaths. We recorded 0.15% of uretero-vesical lesions, unlike Onsrud [36] who, in eastern DRC where insecurity reigns, found that 25% of all fistulas treated were caused by cesarean section, but in the context of rape. The overall mortality was 0.56% in our study (no anesthesia-related deaths), lower than the 1% found by Fenton [37] in Malawi. Ouro-Bang'na Maman AF [38] estimates that mortality linked to anesthesia in general is more than 4 times in Togo. This mortality rate varies from country to country and from hospital to hospital, from 0.87% to 3.88% [12]. Bleeding is an important part, as other authors have noted [15] [39] [40]. A WHO-led study [41] had shown the role of hemorrhage (26.7%) and pre-eclampsia (25.9%) in maternal mortality as we have found. Our hysterectomy rate is high: 0.32% more than Trabelsi [16] 0.07% and this is associated with significant mortality because these were the women referred with uterine rupture in a state of persistent hemorrhagic shock. The lack of technical facilities for arterio embolization made hysterectomy the only maternal lifesaving solution [42]. Haemorrhages (uterine rupture, DPPNI, placenta previa) and preeclampsia are still the major causes of

maternal mortality as found by several authors [43] [44] [45].

The limits of this study lie in its monocentric nature, which does not allow the results to be generalized over the entire city of Kinshasa or the whole country.

5. Conclusions

The overall maternal mortality in this series was 0.56%. No maternal deaths related to anesthesia, either general or locoregional, have been recorded. Maternal morbidity is low and represented mainly by intraoperative hypotension without consequences. Uterine rupture, hemorrhagic placenta previa and eclampsia are major causes of maternal death.

In multivariate analysis: general anesthesia, extreme emergency, intraoperative transfusion and coma persisted as determinants of mortality in this series. However, general anesthesia as well as blood transfusion is a consequence of the severe maternal condition, often hemorrhagic shock contraindicating the realization of a locoregional anesthesia and imposing general anesthesia and blood transfusion. Bleeding appears to be an important element that must be acted upon to reduce maternal mortality, as it is decried throughout the literature. In perspective, a provincial or national multicenter study would be useful to have a more precise idea of the situation in our country.

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Authors' Contribution

WMD: design and writing of the manuscript, NKM: writing of the manuscript, ANN: statistical analyzes and correction of the manuscript, LTM: correction of the manuscript, all other authors: reading of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Annex**Data collection sheet**

Age	<18 years	18 - 35 ans years	>35 years
BMI	>18.5 >29.9	18.6 - 24.9	25 - 29.9
Uterine height	<30 cm	30 - 34 cm	>34 cm
Prenatal consultation	Monkole	Referred	
Parity	Primiparous Grand multiparous	Pauciparous	Multiparous
Indications for caesarean section			
Emergency degree	Relative urgency	Absolute urgency	Extreme urgency
Glasgow at the admission			
ASA class	I IV	II V	III
Mallampati grade	I IV	II	III
Cormack grade	I IV	II	III
Hb level	<7 g/dl	7 - 10.9 g/dl	>10.9 g/dl
Platelets	<150,000	>150,000	
Anesthetic technique	GA LRA		
Intraoperative complications			
Postoperative complications			
Anaesthesiologist	Senior	Junior	
Operator	Senior	Junior	
Intraoperative transfusion	Non	Oui (quantité)	
Maternal issue	No death	Death	
Time of intervention	Nigth	Day	
Causes of maternal death			
Operative procedure	Caesarean section	Caesarean and other act	Other act